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MIDWINTER. *s.* (*mid* and *winter.*) The winter solstice (*Dryden*).

MIEGIA, in botany, a genus of the class triandria, order monogynia. Calyx two-valved, one-flowered; corol two-valved; nectary one-valved, involving the germ. One species, a grass of South America.

MIEL (Jan), a Flemish painter, born in 1599. He was the disciple of Gerard Segers, after which he went to Italy, where he greatly improved himself. His pictures of huntings are greatly admired, the figures and the animals being accurately drawn, and with much spirit. He died in 1664.

MIEN. *s.* (*mine*, Fr.) Air; look; manner (*Dryden*).

MIERIS (Francis), or the Elder, was a disciple of Gerard Douw, and born at Leyden in 1635. He imitated his master with great exactness, and his pictures are now extremely scarce and valuable. He died in 1681.

MIERIS (William), the son of the preceding, was born at Leyden in 1662. He painted historical subjects, and also landscapes with animals, in an excellent style. He was likewise a good modeller in clay and wax. He died in 1747. His son Francis was a good artist, and painted in the same manner as his father.

MIEZA, in ancient geography, a town of Macedonia, situated near Stagira.

MIGHT. The preterit of *may*.

MIGHT. *s.* (mıʒht, Saxon.) Power; strength; force (*Ayliffe*).

MIGHT *and main*. Utmost force; highest degree of strength (*Dryden*).

MIGHTILY. *ad.* (from *mighty*.) 1. With great power; powerfully; efficaciously; forcibly (*Hooker*). 2. Vehemently; vigorously; violently (*Shakspeare*). 3. In a great degree; very much (*Spectator*).

MIGHTINESS. *s.* (from *mighty*.) Power; greatness; height of dignity (*Shakspeare*).

MIGHTY. *a.* (from *might*.) 1. Strong; valiant (*Milton*). 2. Powerful (*Genesis*). 3. Impetuous; violent (*Isaiah*). 4. Vast; enormous; bulky (*Milton*). 5. Excellent; of superior eminence (*Dryden*) 6. Forcible; efficacious (*Esdras*).

MIGHTY. *ad.* In a great degree (*Prior*).

MIGMA. (from μιγνυω, to mix). A confect, ointment, or mass of things mixed together.

MIGNARD (Nicholas), a French painter, born at Troyes about 1608 He became rector of the academy of painting at Paris. He excelled in painting historical subjects and portraits. He died in 1668.

MIGNARD (Peter), called the Roman from his long residence at Rome, was the brother of the preceding, and born in 1610. He is allowed to have been a superior artist to Nicholas, and was ennobled by Louis XIV. whose portrait he painted several times. He died in 1695.

MIGNON (Abraham), a painter, born at Frankfort in 1639. He painted flowers, insects, fruit, and still life, after nature, with wonderful exactness. He died in 1679.

MIGNONETTE, in botany. See RESEDA.

MIGRATION. *s.* (*migratio*, Latin.) 1. Act of changing residence (*Brown*). 2. Change of place; removal (*Woodward*).

MIGRATION OF SOULS. See METEMPSYCHOSIS and TRANSMIGRATION.

MIGRATION OF BIRDS. It is believed that many different kinds of birds annually

pass from one country to another, and spend the summer or the winter where it is most agreeable to them; and that even the birds of our own island will seek the most distant southern regions of Africa, when directed by a peculiar instinct to leave their own country. It has long been an opinion pretty generally received, that swallows reside during the winter-season in the warm southern regions; and Mr. Adanson particularly relates his having seen them at Senegal, when they were obliged to leave this country. But besides the swallow, Mr. Pennant enumerates many other birds which migrate from Britain at different times of the year, and are then to be found in other countries; after which they again leave these countries, and return to Britain. The reason of these migrations he supposes to be a defect of food at certain seasons of the year, or the want of a secure asylum from the persecution of man during the time of courtship, incubation, and nutrition. The following is his list of the migrating species.

1. Crows.—Of this genus, the hooded crow migrates regularly with the woodcock. It inhabits North Britain the whole year: a few are said annually to breed on Dartmoor in Devonshire. It breeds also in Sweden and Austria: in some of the Swedish provinces it only shifts its quarters, in others it resides throughout the year. Our author is at a loss for the summer retreat of those which visit us in such numbers in winter, and quit our country in the spring; and for the reason why a bird, whose food is such that it may be found at all seasons in this country, should leave us.

2. Cuckoo.—Disappears early in autumn; the retreat of this and the following bird is quite unknown to us.

3. Wryneck.—Is a bird that leaves us in the winter. If its diet be ants alone, as several assert, the cause of its migration is very evident. This bird disappears before winter, and revisits us in the spring, a little earlier than the cuckoo.

4. Hoopoe.—Comes to England but by accident: Mr. Pennant once indeed heard of a pair that attempted to make their nest in a meadow at Selborne, Hampshire, but were frightened away by the curiosity of people. It breeds in Germany.

5. Grous.—The whole tribe, except the quail, lives here all the year round: that bird either leaves us, or else retires towards the sea-coasts.

6. Pigeons.—Some few of the ring-doves breed here; but the multitude that appears in the winter is so disproportioned to what continue here the whole year, as to make it certain that the greatest part quit the country in the spring. It is most probable they go to Sweden to breed, and return from thence in autumn; as Mr. Ekmark informs us, they entirely quit that country before winter. Multitudes of the common wild pigeons also make the northern retreat, and visit us in winter; not but numbers breed in the high cliffs in all parts of this island. The turtle also probably leaves us in the winter, at least changes its place, removing to the southern counties.

7. Stare.—Breeds here. Possibly several remove to other countries for that purpose, since the produce of those that continue here seems unequal to the clouds of them that appear in the winter. It is not unlikely that many of them migrate into Sweden, where Mr. Berger observes they return in spring.

8. Thrushes.—The fieldfare and the red-wing breed and pass their summers in Norway and other cold countries; their food is berries, which abounding in our kingdoms tempt them here in the winter. These two, and the Royston crow, are the only land birds that regularly and constantly migrate into England, and do not breed here. The hawfinch and crossbill come here at such uncertain times as not to deserve the name of birds of passage.

9. Chatterer.—The chatterer appears annually about Edinburgh in flocks during winter, and feeds on the berries of the mountain-ash. In South Britain it is an accidental visitant.

10. Grosbeaks.—The grosbeak and crossbill come here but seldom; they breed in Austria. The pine grosbeak probably breeds in the forests of the highlands of Scotland.

11. Buntings.—All the genus inhabits England throughout the year, except the greater brambling, which is forced here from the north in very severe seasons.

12. Finches.—All continue in some parts of these kingdoms, except the siskin, which is an irregular visitant, said to come from Russia. The linnets shift their quarters, breeding in one part of this island, and remove with their young to others. All finches feed on the seeds of plants.

13. Larks, Fly-catchers, Wagtails and Warblers.—All of these feed on insects and worms; yet only part of them quit these kingdoms, though the reason of migration is the same to all. The nightingale, black cap, fly-catcher, willow-wren, wheat-ear, and white-throat, leave us before winter, while the small and delicate golden-crested wren braves our severest frosts. The migrants of this genus continue longest in Great Britain in the southern counties, the winter in those parts being later than in those of the north; Mr. Stillingfleet having observed several wheat-ears in the isle of Purbeck on the 18th of November. As these birds are incapable of very distant flights, Spain, or the south of France, is probably their winter-asylum.

14. Swallows and Goat-sucker.—Every species disappears at the approach of winter.

Water-Fowl.

Of the vast variety of water-fowl that frequent Great Britain, it is amazing to reflect how few are known to breed here: the cause that principally urges them to leave this country seems to be not merely the want of food, but the desire of a secure retreat. Our country is too populous for birds so shy and timid as

the bulk of these are. when great part of our island was a mere waste, a tract of woods and fen, doubtless many species of birds (which at this time migrate) remained in security throughout the year. Egrets, a species of heron, now scarce known in this island, were in former times in prodigious plenty; and the crane, that has totally forsaken this country, bred familiarly in our marshes; their place of incubation, as well as of all other cloven-footed water-fowl (the heron excepted), being on the ground, and exposed to every one. As rural economy increased in this country, these animals were more and more disturbed; at length, by a series of alarms, they were necessitated to seek, during the summer, some lonely safe habitation.

On the contrary, those that build or lay in the almost inaccessible rocks that impend over the British seas breed there still in vast numbers, having little to fear from the approach of mankind: the only disturbance they meet with in general being from the desperate attempts of a few to get their eggs.

Cloven-footed Water-Fowl.

15. Herons.—The white heron is an uncommon bird, and visits us at uncertain seasons; the common kind and the bittern never leave us.

16. Curlews.—The curlew breeds sometimes on our mountains, but considering the vast flights that appear in winter, it is probable that the greater part retire to other countries: the whimbrel breeds on the Grampian hills, in the neighbourhood of Invercauld.

17. Snipes.—The woodcock breeds in the moist woods of Sweden and other cold countries. Some snipes breed here, but the greatest part retire elsewhere; as do every other species of this genus.

18. Sandpipers.—The lapwing continues here the whole year; the ruff breeds here, but retires in winter; the redshank and sandpiper breed in this country and reside here. All the others absent themselves during summer.

19. Plovers and Oyster-catcher.—The long-legged plover and sanderling visit us only in winter; the dottrel appears in spring and in autumn; yet, what is very singular, we do not find it breeds in South Britain. The oyster-catcher lives with us the whole year. The Norfolk plover and sea-lark breed in England. The green plover breeds on the mountains of the north of England, and on the Grampian hills.

We must here remark, that every species of the genera of curlews, woodcocks, sandpipers, and plovers, that forsake us in the spring, retire to Sweden, Poland, Prussia, Norway, and Lapland, to breed: as soon as the young can fly, they return to us again, because the frosts which set in early in those countries totally deprive them of the means of subsisting; as the dryness and hardness of the ground, in general, during our summer, prevent them from penetrating the earth with their bills, in search of worms, which are the natural food of these birds. Mr. Ekmark speaks thus of the retreat of the whole tribe of cloven-footed water-fowl out of his country (Sweden) at the approach of winter; and Mr. Klein gives much the same account of those of Poland and Prussia.

20. Rails and Gallinules.—Every species of these two genera continue with us the whole year; the land rail excepted, which is not seen here in winter. It likewise continues in Ireland only during the summer-months, when they are very numerous, as Mr. Smith tells us in the History of Waterford, p. 336. Great numbers appear in Anglesea the latter end of May; it is supposed that they pass over from Ireland, the passage between the two islands being but small. As we have instances of these birds lighting on ships in the Channel and the Bay of Biscay, we may conjecture their winter-quarters to be in Spain.

Finned-footed Water-Birds.

21. Phalaropes.—Visit us but seldom; their breeding place is Lapland, and other arctic regions.

22. Grebes.—The great-crested grebe, the black and white grebe, and the little grebe, breed with us, and never migrate; the others visit us accidentally, and breed in Lapland.

Web-footed Birds.

23. Avoset.—Breed near Fossdike in Lincolnshire, but quit their quarters in winter. They are then shot in different parts of the kingdom, which they visit, not regularly, but accidentally.

24. Auks and Guillemots.—The great auk or penguin sometimes breeds in St. Kilda. The auk, the guillemot, and puffin, inhabit most of the maritime cliffs of Great-Britain, in amazing numbers during summer. The black guillemot breeds in the Bass Isle, and in St. Kilda, and sometimes in Llandidno rocks. We are at a loss for the breeding-place of the other species; neither can we be very certain of the winter residence of any of them, excepting of the lesser guillemot and black-billed auk, which, during winter, visit in vast flocks the Frith of Forth.

25. Divers.—These chiefly breed in the lakes of Sweden and Lapland, and in some countries near the pole; but some of the red-throated divers, the northern and the imber, may breed in the north of Scotland and its isles.

26. Terns.—Every species breeds here; but leaves us in the winter.

27. Petrels.—The fulmar breeds in the isle of St. Kilda, and continues there the whole year except September and part of October. The shearwater visits the isle of Man in April; breeds there; and, leaving it in August or the beginning of September, disperses over all parts of the Atlantic ocean. The stormfinch is seen at all distances from land on the same vast watery tract; nor is ever found near the shore except by some very rare accident, unless in the breeding season. Mr. Pennant found it on some little rocky isles on the north of

Skye. It also breeds on St. Kilda. He also suspects that it nestles on the Blasquet isles off Kerry, and that it is the gourder of Mr. Smith.

28. Mergansers.—This whole genus is mentioned among the birds that fill the Lapland lakes during summer. Mr. Pennant has seen the young of the red-breasted in the north of Scotland: a few of these, and perhaps of the goosanders, may breed there.

29. Ducks.—Of the numerous species that form this genus, we know of few that breed here: the swan and goose, the shield-duck, the eider-duck, a few shovellers, garganies, and teals, and a very small portion of the wild ducks.

The rest contribute to form that amazing multitude of water-fowl that annually repair from most parts of Europe to the woods and lakes of Lapland and other arctic regions, there to perform the functions of incubation and nutrition in full security. They and their young quit their retreat in September, and disperse themselves over Europe. With us they make their appearance the beginning of October; circulate first round our shores; and, when compelled by severe frost, betake themselves to our lakes and rivers. Of the web-footed fowl there are some of hardier constitutions than others: these endure the ordinary winters of the more northern countries; but when the cold reigns there with more than common rigour, they repair for shelter to these kingdoms: this regulates the appearance of some of the diver kind, as also of the wild swans, the swallow-tailed shield-duck, and the different sorts of goosanders which then visit our coasts. Barentz found the barnacles with their nests in great numbers in Nova Zembla. (Collect. Voy. Dutch East India Company, 8vo. 1703, p. 19.) Clusius, in his Exot. 368. also observes, that the Dutch discovered them on the rocks of that country and in Waygate Straits. They, as well as the other species of wild geese, go very far north to breed, as appears from the histories of Greenland and Spitzbergen, by Egede and Crantz. These birds seem to make Iceland a resting-place, as Horrebow observes: few continue there to breed, but only visit that island in the spring, and after a short stay retire still further north.

30. Corvorants.—The corvorant and shag breed on most of our high rocks: the gannet in some of the Scotch isles, and on the coast of Kerry: the two first continue on our shores the whole year. The gannet disperses itself all round the seas of Great Britain, in pursuit of the herring and pilchard, and even as far as the Tagus to prey on the sardina.

But of the numerous species of fowl here enumerated, it may be observed how very few entrust themselves to us in the breeding season, and what a distant flight they make to perform the first great dictate of nature.

There seems to be scarcely any but what we have traced to Lapland, a country of lakes, rivers, swamps, and alps, covered with thick and gloomy forests, that afford shelter during summer to these fowls, which in winter disperse over the greatest part of Europe. In those arctic regions, by reason of the thickness of the woods, the ground remains moist and penetrable to the woodcocks, and other slender-billed fowl; and for the web-footed birds, the waters afford larves innumerable of the tormenting gnat. The days there are long; and the beautiful meteorous nights indulge them with every opportunity of collecting so minute a food, whilst mankind is very sparingly scattered over that vast northern waste.

Why then should Linnéus, the great explorer of these rude deserts, be amazed at the myriads of water-fowl that migrated with him out of Lapland? which exceeded in multitude the army of Xerxes; covering for eight whole days and nights the surface of the river Calix! His partial observation as a botanist would confine their food to the vegetable kingdom, almost denied to the Lapland waters; inattentive to a more plenteous table of insect food, which the all-bountiful Creator had spread for them in the wilderness. It may be remarked, that the lakes of mountainous rocky countries in general are destitute of plants: few or none are seen on those of Switzerland; and Linnéus makes the same observation in respect to those of Lapland, having during his whole tour discovered only a single specimen of a lemna trisulca, or ivy-leaved duck's meat, Flora Lap. No. 470, a few of the scirpus lacustris, or bullrush, No. 18; the alopecurus geniculatus, or flote foxtail grass, No. 38; and the ranunculus aquatilis, No. 234; which are all he enumerates in his Prolegomena to that excellent performance.

MIKANIA. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; calyx four or six-leaved; four or six-flowered; down simple. Fourteen species; natives of the East or West Indies; one or two of Sierra Leone; some with scandent, others with erect, stems.

MILAN, a city of Italy, capital of a duchy of the same name. It was the ancient capital of Lombardy; and although it is thought rather to exceed Naples in size, it does not contain above half the number of inhabitants. It is seated in a delightful plain, between the rivers Adda and Tesin; is 10 miles in circumference, and called by the Italians, Milan the Great. It contains many fine palaces, but that of the governor is the most magnificent: and a great number of churches, convents, hospitals, and schools. The cathedral is in the centre of the city, and, next to St. Peter's at Rome, is the most considerable in Italy. The number of statues, within and without, is prodigious; they are all of marble, and many of them finely wrought. This vast fabric, which the Milanese call the eighth wonder of the world, is entirely built of solid white marble, and supported by fifty columns. From the roof hangs a case of crystal, inclosing a nail, which, they say, is one of those by which our Saviour was fixed to the cross. The treasury belonging to this church is reckoned the richest

in Italy, next to that of Loretto. The college of St. Ambrose has a library, which, besides a prodigious number of manuscripts, contains 45,000 printed books; and its superb gallery is adorned with rich paintings. Milan has considerable commerce in grain (especially rice), cattle, and cheese; and has manufactures of silk and velvet stuffs, stockings, handkerchiefs, ribands, gold and silver lace and embroideries, woollen and linen cloths, glass, and earthenware in imitation of China. It has been several times taken in the wars that have desolated Italy; the last time by the French, in June 1796. It is the see of an archbishop; and is 70 miles north of Genoa, 72 north-east of Turin, and 145 north-west of Florence. Lon. 9. 16 E. Lat. 45. 28 N.

MILAN, or MILANESE, a duchy of Italy, 150 miles long, and 78 broad; bounded on the N. by Swisserland and the country of the Grisons, on the E. by the republic of Venice and the duchies of Parma and Mantua, on the S. by the duchy of Parma and the territory of Genoa, and on the W. by Piedmont and Montferrat. The soil is every where fertile in corn, wine, fruits, rice, and olives. The rivers are the Secchia, Tesin, Adda, and Oglio; and it has several lakes, the principal of which are those of Maggiore, Como, and Lugano. This country having formerly been possessed by the French, next by the Spaniards, and afterward by the Germans, the troops of those nations have produced a style of manners, and stamped a character, in the inhabitants of this duchy, different from what prevails in any other part of Italy; and nice observers imagine they perceive in the manners of the Milanese the politeness, formality, and honesty imputed to those three nations, blended with the natural ingenuity of the Italians. This duchy was entirely overrun by the French in 1796, and formed the principal part of their Cisalpine republic. On the renewal of hostilities, however, in 1799, it was soon reconquered by the allies. At present it is at the disposal of the emperor of the French.

MILAZZO, a strong seaport of Sicily, in Val-di-Demona. It is divided into the upper and lower town; the upper is very strong, and the lower has a fine square, with a superb fountain. It is seated on a rock, on the W. side of a bay of the same name, 13 miles W. of Messina. Lon. 15. 34 E. Lat. 38. 12 N.

MILBORN-PORT, a borough in Somersetshire, which has no market, but sends two members to parliament. It has manufactures of woollen cloth, linen, and hosiery; and is seated on a branch of the Parret, two miles E. by N. of Sherborn, and 115 W. by S. of London. Lon. 2. 38 W. Lat. 50. 53 N.

MILBOURNE (Luke) an English divine, was A. M. and rector of St. Ethelburga in London. He published several single sermons, a poetical version of the Psalms, and several poems and pamphlets, for which Pope gives him a place in the Dunciad. He died in 1720.

MILCH. *a.* (from *milk.*) Giving milk (*Shakspeare*).

MILD. *a.* (milde, Saxon.) 1. Kind; tender; good; indulgent; merciful; compassionate; clement (*Rogers*). 2. Soft; gentle; not violent (*Pope*). 3. Not acrid; not corrosive; not acrimonious, demulcent; assuasive (*Arbuthnot*). 4. Not sharp; mellow; sweet; having no mixture of acidity (*Davies*).

MILDENHALL, a town in Suffolk, with a market on Friday; seated on the Larke, a branch of the Ouse, 13 miles N. by E. of Newmarket, and 69 N.N.E. of London. Lon. 0. 26 E. Lat. 52. 29 N.

MILDEW, in botany. See MUCOR, and ÆCIDIUM.

To MI'LDEW. *v. a.* To taint with mildew (*Gay*).

MI'LDLY. *ad.* (from *mild.*) 1. Tenderly; not severely (*Dryden*). 2. Gently; not violently (*Bacon*).

MI'LDNESS. *s.* (from *mild.*) Gentleness; tenderness; mercy; clemency (*Addison*).

MILE, a measure of length or distance, containing eight furlongs. The English statute-mile is 80 chains, or 1760 yards; that is, 5280 feet. We shall here give a table of the miles in use among the principal nations of Europe, in geometrical paces, 60,000 of which make a degree of the equator.

	Geometrical paces.
Mile of Russia	750
of Italy	1000
of England	1200
of Scotland and Ireland	1500
Old league of France	1500
The small league, ibid.	2000
The mean league, ibid.	2500
The great league, ibid.	3000
Mile of Poland	3000
of Spain	3428
of Germany	4000
of Sweden	5000
of Denmark	5000
of Hungary	6000

MI'LESTONE. *s.* (*mile* and *stone.*) Stone set to mark the miles.

MILETO, an ancient town of Naples, in Calabria Ulteriore, with a bishop's see, five miles from Nicotera.

MILETS, anciently MILETUS, a town of Turkey in Asia, in Natolia, 64 miles S. of Smyrna. Lon. 27. 14 E. Lat. 38. 22 N.

MILETUS (anc. geog.), a town of Crete mentioned by Homer; but where situated does not appear. It is said to be the mother-town of Miletus in Caria, whither a colony was led by Sarpedon, Minos's brother, (Ephorus, quoted by Strabo.) Milesii, the people, (Ovid.)

MILETUS (anc. geog.), a celebrated town of Asia Minor, on the confines of Ionia and Caria. It was the capital city of all Ionia, and famous both for the arts of war and peace. It

was situated about 10 stadia south of the mouth of the river Mæander, near the sea-coast. It was founded by a Cretan colony under Miletus, the companion of Bacchus; or (according to others) by Neleus the son of Codrus; or by Sarpedon a son of Jupiter. It has successively been called Lelegeis, Pithyusa, and Anactoria. The inhabitants, called Melesii, were very powerful, and long maintained an obstinate war against the kings of Lydia. They early applied themselves to navigation, and planted no less than 80 colonies, or (according to Seneca) 380, in different parts of the world. It was the only town that made head against Alexander, and with much difficulty taken. It gave birth to Thales.

Miletus, a son of Apollo, who fled from Crete to avoid the wrath of Minos, whom he meditated to dethrone. He came to Caria, where he built or conquered a city which he called by his own name.

MILFOIL, in botany. See Achillea.

MILFORD, a town of the state of Delaware, in the county of Sussex, seated at the source of a small river, 15 miles from the bay of Delaware, and 150 S. of Philadelphia.

Milford, a town of S. Wales, in Pembrokeshire, on the N. coast of Milford Haven. A company of quakers, from America, have formed a plan for establishing here a whale fishery in the southern seas. A new quay has been built, and a considerable number of buildings erected toward forming a town. It is six miles W.N.W. of Pembroke, and six S.S.W. of Haverfordwest.

Milford Haven, a deep inlet of the Irish sea, on the coast of Pembrokeshire. It branches off into so many creeks, secured from all winds, that it is esteemed the safest and most capacious harbour in Great Britain; but its remote situation greatly impairs its utility. At the entrance, on the W. point, called St. Ann's, is an old lighthouse and a blockhouse. Here the earl of Richmond, afterwards Henry VII. landed, on his enterprise against Richard III. A packet-boat sails hence every day, except Tuesday, for Waterford, in Ireland.

MILIANE, a town of the state of Algiers in Tremesen, with a castle. It is seated in a country fertile in oranges, citrons, and other fruits, the best in Barbary. Lon. 2. 35 E. Lat. 35. 15 N.

MILIARIA. (*miliaria*, from *milium*, millet: so called because the small pustules or vesicles upon the skin resemble millet-seed). Miliary fever. A genus of disease in the class pyrexia, and order exanthemata of Cullen; characterised by synochus: cold stage considerable: hot stage attended with anxiety and frequent sighing; perspiration of a strong and peculiar smell; eruption preceded by a sense of pricking, first on the neck and breast, of small red pimples, which in two days become white pustules, desquamate, and are succeeded by fresh pimples. For the eruption similar to miliaria, but unattended with fever. See Sudamina.

MI'LIARY. *a.* (*milium*, Lat. millet.) Small; resembling a millet-seed (*Cheyne*).

Miliary fever. A fever that produces small eruptions. See Medicine.

MI'LICE. *s.* (Fr.) Standing force (*Temple*).

MI'LITANT. *a.* (*militans*, Latin.) 1. Fighting; prosecuting the business of a soldier (*Spenser*). 2. Engaged in warfare with hell and the world. A term applied to the church of Christ on earth, as opposed to the church triumphant (*Rogers*).

MI'LITAR. Mi'litary. *a.* (*militaris*, Latin. *Militar* is now out of use.) 1. Engaged in the life of a soldier; soldierly (*Shakspeare*). 2. Suiting a soldier; pertaining to a soldier; warlike (*Prior*). 3. Effected by soldiers (*Baron*).

Military tenures. See Tenu're, Feodal system, and Knight.

Military ways (*viæ militares*), are the large Roman roads which Agrippa procured to be made through the empire in the time of Augustus, for the more convenient marching of troops and conveyance of carriages. N. Bergier has written the history of the origin, progress, and amazing extent of these military roads, which were paved from the gates of Rome to the extreme parts of the empire. See Way.

MILITIA, in general, denotes the body of soldiers, or those who make a profession of arms. In a more restrained sense, militia denotes the trained bands of a town or country, who arm themselves, upon a short warning, for their own defence. So that, in this sense, militia is opposed to regular or stated troops.

With us, however, militia signifies the national soldiery; the standing force of the nation.

It seems universally agreed by all historians, that king Alfred first settled a national militia in this kingdom, and by his prudent discipline made all the subjects of his dominions soldiers; but we are unfortunately left in the dark as to the particulars of this celebrated regulation

The feodal military tenures were established for the purpose of protection, and sometimes of attack against foreign enemies: (see this Dictionary, title Tenures.) For the further defence in cases of domestic insurrections or foreign invasions, various other plans have been adopted, all of them tending to unite the character of a citizen and soldier in one. First, The Assize of Arms, enacted 27 H. 2, and afterwards the stat. of Winchester, 13 E. 1. c. 6, obliged every man, according to his state and degree, to provide a certain quantity of such arms as were then in use; and it was part of the duty of constables under the latter statute to see such arms provided. These weapons were changed by stat. 4 & 5 P. & M. c. 2, into more modern ones; but both these provisions were repealed by stats. 1 Jac. 1. c. 25; 21 Jac. 1. c. 28. While these continued in force, it was usual, from time to time, for our princes to issue commissions of array; and send into every county officers in whom they could

confide, to muster and array (or set in military order) the inhabitants of every district; and the form of the commission of array was settled in parliament, anno 5 Hen. 4, so as to prevent the insertion therein of any new penal clauses. Rushw. pt. 3. p. 662, 7. See 8 Rep. 375, &c. But it was also provided by stats. 1 E. 3. st. 2. cc. 5, 7: 25 E. 3. st. 5. c. 8, that no man should be compelled to go out of the kingdom at any rate, nor out of his shire, but in cases of urgent necessity; nor should provide soldiers unless by consent of parliament. About the reign of king Henry VIII, or his children, lieutenants began to be introduced, as standing representatives of the crown to keep the counties in military order; for we find them mentioned as known officers in the stat. 4 & 5 P. & M. c. 3, though they had then not been long in use; for Camden speaks of them in the time of queen Elizabeth, as extraordinary magistrates constituted only in times of difficulty and danger. But the introduction of these commissions of lieutenancy, which contained in substance the same powers as the old commissions of array, caused the latter to fall into disuse.

In this state things continued till the repeal of the statutes of armour in the reign of king James I.; after which, when king Charles I. had, during his northern expeditions, issued commissions of lieutenancy, and exerted some military powers, which having been long exercised, were thought to belong to the crown, it became a question in the long parliament, how far the power of the militia did inherently reside in the king; being now unsupported by any statute, and founded only upon immemorial usage. This question, long agitated with great heat and resentment on both sides, became at length the immediate cause of the fatal rupture between the king and his parliament: the two houses not only denying this prerogative of the crown, the legality of which might, perhaps, be somewhat doubtful; but also seizing into their own hands the entire power of the militia; the illegality of which step could never be any doubt at all.

Soon after the restoration of king Charles II. when the military tenures were abolished, it was thought proper to ascertain the power of the militia, to recognise the sole right of the crown to govern and command them, and to put the whole into a more regular method of military subordination. And the order in which the militia now stands by law is principally built upon the stats. 13 C. 2. c. 6: 14 C. 2 c. 3: 15 C. 2. c. 4. which were then enacted. It is true, the two last of them are apparently repealed, but many of their provisions are re-enacted with the addition of some new regulations by the present militia laws: the general scheme of which is to discipline a certain number of the inhabitants of every county chosen by lot formerly for *three*, but now (by stat. 26 Geo. 3. c. 107) for *five* years, and officered by the lord lieutenant, the deputy lieutenants, and other principal landholders, under a commission from the crown. They are not compellable to march out of their counties unless in case of invasion or actual rebellion within the realm, (or any of his majesty's dominions or territories, stat. 16 Geo. 3. c. 3) nor in any case compelled to march out of the kingdom. They are to be exercised at stated times; and their discipline in general is liberal and easy; but when drawn out into actual service, they are subject to the rigours of martial law, as necessary to keep them in order. This is the constitutional security which our laws have provided for the public peace, and for protecting the realm against foreign or domestic violence. See stats. 2 Geo. 3. c. 20: 9 Geo. 3. c. 42: 16 Geo. 3. c. 3: 18 Geo. 3. cc. 14, 59: 19 Geo. 3. c. 72: 20 Geo. 3. c. 107: and 1 Comm. 410, &c.

The act reducing into one all the laws relating to the militia is stat. 26 Geo. 3. c. 107. This mentions the particular quota of each county and district in England and Wales, the whole number amounting to 30,740. And it is by this act provided, that in cases of actual invasion or imminent danger thereof, and in cases of rebellion and insurrection, his majesty may embody the militia: and if parliament is not then sitting, they are to meet by proclamation in 14 days.

Subsequent acts have given rise to the supplementary militia, the local militia, &c. but we have not room to describe these acts here.

MILIUM, Millet, in botany, a genus of the digynia order, belonging to the triandria class of plants; and in the natural method ranking under the fourth order, Gramina. The calyx is bivalved and uniflorous; the corol is very short; the stigmata pencil-like. There are five species, of which the most remarkable is the panicum, or common millet. This is a native of India, but is now commonly cultivated in many parts of Europe as an esculent grain. It rises, with a reed-like stalk, three or four feet high, and channelled. at every joint there is one reed-like leaf, which is joined on the top of the sheath, and embraces and covers that joint of the stalk below the leaf; this sheath is closely covered with soft hairs, but the leaf which is expanded has none. The top of the stalk is terminated by a large loose panicle, which hangs on one side, having a chaffy flower, which is succeeded by a small round seed. There are two varieties; one with white, and the other with black seeds; but they do not differ in any other particular. This plant is greatly cultivated in the oriental countries, and from whence we are annually furnished with it. It is seldom cultivated in Britain, but in small gardens, for feeding of poultry, where the seeds generally ripen very well. It is used as an ingredient in puddings, and is by some people greatly esteemed. The seeds must be sown in the beginning of April, upon a warm dry soil, but not too thick, because the plants divide into several branches, and should have much room. When they come up, they should be cleansed from weeds; after which they will in a short time get the better of them. and prevent the future growth. In August the seeds will ripen, when the

plant must be cut down, and the seeds beaten out, as is practised for other grain; but if it is not protected from birds, they will devour it as soon as it begins to ripen.

MILIUM. (*milium.*) Grutum. In medicine, a very white and hard tubercle, in size and colour resembling a millet-seed. Its seat is immediately under the cuticle, so that when pressed it escapes, the contents appearing of an atheromatous nature.

MILIUM SOLIS. See LITHOSPERMUM.

MILK. (*milch*, Germ. *lait*, Fr). A fluid secreted by peculiar glands, and designed to nourish young animals in the early part of their life. It is of an opaque white colour, a mild saccharine taste, and a slightly aromatic smell. It is separated immediately from the blood in the breasts or udders of female animals. Man, quadrupeds, and cetaceous animals are the only creatures which afford milk. All other animals are destitute of the organs which secrete this fluid. Milk differs greatly in the several animals.

This fluid, the next in importance of all the animal liquids to blood, has been examined very largely by different chemists, and its analysis is curious and important. Scheele, Fourcroy, and Vauquelin, Parmentier, Deyeux and many others have given particular attention to this subject, and from their united labours the following general account of its properties may be given.

Milk is a white opaque fluid, capable of moistening all substances that can be moistened by water: but its consistence is greater than that of water, and it is slightly unctuous: like water, it freezes when cooled down to about 30°; but Parmentier and Deyeux found that its freezing-point varies considerably in the milk of different cows, and even of the same cow at different times. Milk boils also when sufficiently heated; but the same variation takes place in the boiling-point of different milks, though it never deviates very far from the boiling-point of water. Milk is specifically heavier than water, and lighter than blood; but the precise degree cannot be ascertained, because almost every particular milk has a specific gravity peculiar to itself.

When milk is allowed to remain for some time at rest, there collects on its surface a thick unctuous yellowish-coloured substance, known by the name of cream. The cream appears sooner on milk in summer than in winter, evidently owing to the difference of temperature. In summer, about four days of repose are necessary before the whole of the cream collects on the surface of the liquid; but in winter it requires at least double the time.

After the cream is separated, the milk which remains is much thinner than before, and it has a blueish-white colour. If it is heated to the temperature of 100°, and a little rennet (which is water digested with the inner coat of a calf's stomach, and preserved with salt) is poured into it, coagulation ensues; and if the coagulum is broken, the milk very soon separates into two substances; a solid white part known by the name of curd, and a fluid part called whey.

Thus we see that milk may be easily separated into three parts; namely, cream, curd, and whey.

1. Cream is of a yellow colour, and its consistence increases gradually by exposure to the atmosphere. In three or four days it becomes so thick that the vessel which contains it may be inverted without risking any loss. In eight or ten days more, its surface is covered over with mucors and byssi, and it has no longer the flavour of cream, but of very fat cheese. This is the process for making what in this country is called a cream-cheese.

Cream possesses many of the properties of an oil. It is specifically lighter than water; it has an unctuous feel; stains clothes precisely in the manner of oil; and if it is kept fluid, it contracts at last a taste which is very analogous to the rancidity of oils. When kept boiling for some time, a little oil makes its appearance, and floats upon its surface. Cream is neither soluble in alcohol nor in oils. These properties are sufficient to shew us, that it contains a quantity of oil; but this oil is combined with a part of the curd, and mixed with some serum; cream, then, is composed of a peculiar oil, curd, and serum. The oil may be easily obtained separate by agitating the cream for a considerable time. This process, known to every body, is called churning. After a certain time, the cream separates into two portions; one fluid, and resembling creamed milk; the other solid, and called butter.

Butter is of a yellow colour, possesses the properties of an oil, and mixes readily with other oily bodies. When heated to the temperature of 96°, it melts, and becomes transparent; if it is kept for some time melted, some curd and water, or whey, separates from it, and it assumes exactly the appearance of oil. But this process deprives it in a great measure of its peculiar flavour.

When butter is kept for a certain time, it becomes rancid, owing in a good measure to the presence of these foreign ingredients; for if butter is well washed, and a great portion of these matters separated, it does not become rancid nearly so soon as when it is not treated in this manner. It was formerly supposed that this rancidity was owing to the developement of a peculiar acid; but Parmentier and Deyeux have shewn that no acid is present in rancid butter. When butter is distilled, there comes over water an acid, and an oil, at first fluid, but afterwards concrete. The carbonaceous residuum is but small.

Butter may be obtained by agitating cream newly taken from milk, or even by agitating milk newly drawn from the cow; but it is usual to allow cream to remain for some time before it is churned. Now cream, by standing, acquires a sour taste; butter, therefore, is commonly made from sour cream. Fresh

cream requires at least four times as much churning before it yields its butter as sour cream does; consequently cream acquires, by being kept for some time, new properties, in consequence of which it is more easily converted into butter. When very sour cream is churned, every one who has paid the smallest attention must have perceived, that the buttermilk, after the churning, is not nearly so sour as the cream had been. The butter, in all cases, is perfectly sweet; consequently the acid which had been evolved has in a great measure disappeared during the process of churning. It has been ascertained, that cream may be churned, and butter obtained, though the contact of atmospheric air should be excluded. On the other hand, it has been affirmed, that when cream is churned in contact with air, it absorbs a considerable quantity of it.

In all cases there is a considerable extrication of gass during the churning of butter. From the phenomena, it can scarcely be doubted that this gass is carbonic acid. Dr. Young affirms, that during the churning there is an increase of temperature amounting to four degrees.

These facts shew that considerable chemical changes go on during the process of churning. The agitation keeps the different substances in contact, and enables them to act upon each other. The expulsion of carbonic acid accounts for the diminution of acidity after churning; while the other phenomena would lead us to suppose that the cream, before it becomes butter, unites to a new portion of oxygen.

The affinity of the oil of cream for the other ingredients is such, that it never separates completely from them. Not only are curd and whey always found in the cream, but some of this oil is constantly found in creamed milk and whey; for it has been ascertained by actual experiment, that butter may be obtained by churning whey. 27 Scotch pints of whey yield at an average about a pound of butter. This accounts for a fact well known to those who superintend dairies, that a good deal more butter may be obtained from the same quantity of milk, provided it is churned as drawn from the cow, than when the cream alone is collected and churned.

The buttermilk, as Parmentier and Deyeux ascertained by experiment, possesses precisely the properties of milk deprived of cream.

2. Curd, which may be separated from creamed milk by rennet, has many of the properties of coagulated albumen. It is white and solid; and when all the moisture is squeezed out, it has a good deal of brittleness. It is insoluble in water; but pure alkalies and lime dissolve it readily, especially when assisted by heat; and when fixed alkali is used, a great quantity of ammonia is emitted during the solution. The solution of curd in soda is of a red colour, at least if heat is employed; owing probably to the separation of charcoal from the curd by the action of the alkali. Indeed, when a strong heat has been used, charcoal precipitates as the solution cools. The matter dissolved by the alkali may be separated from it by means of an acid; but it has lost all the properties of curd. It is of a black colour, melts like tallow by the application of heat, leaves oily stains on paper, and never acquires the consistence of curd. Hence it appears that curd, by the action of a fixed alkali, is decomposed, and converted into two new substances; ammonia, and oil, or rather fat.

Curd is soluble also in acids. If, over curd newly precipitated from milk, and not dried, there are poured eight parts of water, containing as much of any of the mineral acids as gives it a sensibly acid taste, the whole is dissolved after a little boiling. Acetic acid and lactic acid do not dissolve curd, when very much diluted; but these acids, when concentrated, dissolve it readily, and in considerable quantity. It is remarkable enough, that concentrated vegetable acids dissolve curd readily, but have very little action on it when they are very much diluted; whereas the mineral acids dissolve it when much diluted; but when concentrated, have either very little effect on it, as sulphuric acid, or decompose it, as nitric acid. By means of this last acid, as Berthollet discovered, a quantity of azotic gass may be obtained from curd.

Curd, as is well known, is used in making cheese; and the cheese is the better the more it contains of cream, or of that oily matter which constitutes cream. It is well known to cheesemakers, that the goodness of it depends in a great measure on the manner of separating the whey from the curd. If the milk is much heated, the coagulum broken in pieces, and the whey forcibly separated, as is the practice in many parts of Scotland, the cheese is scarcely good for any thing; but the whey is delicious, especially the whey last squeezed out, and butter may be obtained from it in considerable quantity. This is a full proof that nearly the whole creamy part of the milk has been separated with the whey. Whereas if the milk is not too much heated (about 100 degrees is sufficient), if the coagulum is allowed to remain unbroken, and the whey separated by very slow and gentle pressure, the cheese is excellent; but the whey is almost transparent, and nearly colourless.

Good cheese melts at a moderate heat; but bad cheese, when heated, dries, curls, and exhibits all the phenomena of burning horn. Hence it is evident, that good cheese contains a quantity of the peculiar oil which constitutes the distinguishing characteristic of cream; whence its flavour and smell.

This resemblance of curd and albumen makes it probable that the coagulation of milk and albumen depends upon the same cause. Heat, indeed, does not coagulate milk, because the curd in it is diluted with too large a quantity of water; but if milk is boiled in contact with air, a pellicle soon forms

on its surface, which has the properties of curd. If this pellicle is removed, another succeeds; and by continuing the boiling, the whole of the curdy matter may be separated from milk. When this pellicle is allowed to remain, it falls at last to the bottom of the vessel; where being exposed to a greater heat, it becomes brown, and communicates to milk that disagreeable taste which, in this country, is called a singed taste. It happens more readily when milk is boiled along with rice, flour, &c.

If to boiling milk there is added as much of any neutral salt as it is capable of dissolving, or of sugar or of gum arabic, the milk coagulates and the curd separates. Alcohol also coagulates milk; as do all acids, rennet, and the infusion of the flowers of artichoke and of the thistle. If milk is diluted with ten times its weight of water, it cannot be made to coagulate at all.

3. Whey, after being filtered to separate a quantity of curd which still continues to float through it, is a thin pellucid fluid, of a yellowish-green colour and pleasant sweetish taste, in which the flavour of milk may be distinguished. It always contains some curd: nearly the whole may be separated by keeping the whey for some time boiling; a thick white scum gathers on the surface, which is known by the name of skim-curd. When this scum, which consists of the curdy part, is carefully separated, the whey, after being allowed to remain at rest for some hours, to give the remainder of the curd time to precipitate, is decanted off almost as colourless as water, and scarcely any of the peculiar taste of milk can be distinguished in it. If it is now slowly evaporated, it deposits at last a number of white-coloured crystals, which are sugar of milk. Towards the end of the evaporation, some crystals of muriat of potass and of muriat of soda make their appearance. According to Scheele, it contains also a little phosphat of lime, which indeed may be precipitated by ammonia.

After the salts have been obtained from whey, what remains concretes into a jelly on cooling. Hence it follows that whey also contains gelatine. Whey, then, is composed of water, sugar of milk, gelatine, muriat of potass, and phosphat of lime. The other salts which are sometimes found in it are only accidentally present.

If whey be allowed to remain for some time, it becomes sour, owing to the formation of a peculiar acid known by the name of lactic acid. It is to this property of whey that we are to ascribe the acidity which milk contracts; for neither curd nor cream, perfectly freed from serum, seems susceptible of acquiring acid properties. Hence the reason also that milk, after it becomes sour, always coagulates. Boiled milk has the property of continuing longer sweet, but it is singular enough that it runs sooner to putrefaction than ordinary milk.

The acid of milk differs considerably from the acetic: yet vinegar may be obtained from milk by a very simple process. If to somewhat more than 8lbs troy of milk six spoonfuls of alcohol are added, and the mixture well corked is exposed to a heat sufficient to support fermentation, provided attention is paid to allow the carbonic acid gass to escape from time to time, the whey, in about a month, will be found converted into vinegar.

Milk is almost the only animal substance which may be made to undergo the vinous fermentation, and to afford a liquor resembling wine or beer, from which alcohol may be separated by distillation. This singular fact seems to have been first discovered by the Tartars; they obtain all their spirituous liquors from mare's milk. It has been ascertained, that milk is incapable of being converted into wine till it has become sour; after this nothing is necessary but to place it in the proper temperature; the fermentation begins of its own accord, and continues till the formation of wine is completed. Scheele had shewed that milk was capable of fermenting, and that a great quantity of carbonic acid gass was extricated from it during this fermentation; but he did not suspect that the result of this fermentation was the formation of an intoxicating liquor similar to wine. The Tartars call the vinous liquid which they prepare kumiss. A very exact account of its preparation and medical uses has been published by Dr. Grieve. See the article KUMISS.

When milk is distilled by the heat of a water-bath, there comes over water having the peculiar odour of milk: which putrefies; and consequently contains, besides mere water, some of the other constituent parts of milk. After some time the milk coagulates, as always happens when hot albumen acquires a certain degree of concentration. There remains behind a thick unctuous yellowish-white substance, to which Hoffman gave the name of franchippan. This substance, when the fire is increased, yields at first a transparent liquid, which becomes gradually more coloured; some very fluid oil comes over, then ammonia, an acid, and at last a very thick black oil. Towards the end of the process carbureted hydrogen gass is disengaged. There remains in the retort a coal which contains carbonat of potass, muriat of potass, and phosphat of lime; and sometimes magnesia, iron, and muriat of soda.

Thus we see that cow's milk is composed of the following ingredients:

1. Water,	6. Muriat of soda,
2. Oil,	7. Muriat of potass,
3. Curd,	8. Sulphur,
4. Gelatin,	9. Phosphat of lime.
5. Sugar of milk,	

The milk of all other animals, as far as it has hitherto been examined, consists nearly of the same ingredients: but there is a very great difference in their proportion; and we shall examine those differences, in the more important kinds, as succinctly as possible.

Human Milk.—This is secreted by the glandular fabric of the breast in women. The secretory organ is constituted by the great conglomerate glands situated in the fat of both breasts, above the musculus pectoralis major. From each acinus composing a mammary gland, there arises a radicle of a lactiferous or galactiferous duct. All these canals gradually converging, are terminated without anastomosis in the papillæ of the breasts by many orifices, which upon pressure pour forth milk. The smell of fresh drawn milk is peculiar, animal, fatuous, and not disagreeable. Its taste sweetish, soft, bland, agreeable. The specific gravity is greater than water, but lighter than blood; hence it swims on it. Its colour is white and opaque. In consistence it is oily and aqueous. A drop put on the nail flows slowly down, if the milk be good.

Time of Secretion.—The milk most frequently begins to be secreted in the last months of pregnancy; but on the third day after delivery, a serous milk called colostrum is separated; and at length pure milk is secreted very copiously into the breasts, that from its abundance, often spontaneously drops from the nipples.

If the secretion of milk be daily promoted by suckling an infant, it often continues many years, unless a fresh pregnancy supervene. The quantity usually secreted within twenty-four hours, by nurses, is various, according as the nourishment may be more or less chylous. It appears that not more than two pounds of milk are obtained from five or six pounds of meat. But there have been known nurses, who have given from their breasts two, or even more than three pounds, in addition to that which their child has sucked. That the origin of the milk is derived from chyle carried with the blood of the mammary arteries into the glandular fabric of the breasts, is evident from its more copious secretion a little after meals; its diminished secretion from fasting; from the smell and taste of food or medicines in the secreted milk: and lastly, from its spontaneous acescence; for humours perfectly animal become putrid.

The *milk of a woman* differs: 1. in respect of *food*. The milk of a woman who suckles, living upon vegeto-animal food, never acesces nor coagulates spontaneously, although exposed for many weeks to the heat of a furnace. But it evaporates gradually in an open vessel, and the last drop continues thin, sweet, and bland. The reason appears to be, that the caseous and cremoraceous parts cohere together by means of the sugar, more intimately than in the milk of animals, and do not so easily separate; hence its acescense is prevented. It does acesce, if mixed or boiled with vinegar, juice of lemons, cremor tartar, spirit of vitriol, or with the human stomach. It is coagulated with the acid of salt or nitre, and by the acid gastric juice of the infant; for infants often vomit up the coagulated milk of the nurse. The milk of a sucking woman who lives upon vegetable food only, like cows milk, easily and of its own accord acesces, and is acted upon by all coagulating substances like the milk of animals.—2. In respect of the *time of digestion*. During the first hours of digestion the chyle is crude, and the milk less subacted; but towards the twelfth hour after eating, the chyle is changed into blood, and then the milk becomes yellowish and nauseous, and is spit out by the infant. Hence the best time for giving suck is about the fourth or fifth hour after meals.—3. In respect of the *time after delivery*. The milk secreted immediately after delivery is serous, purges the bowels of the infant, and is called colostrum. But in the following days it becomes thicker and more pure, and the longer a nurse suckles, the thicker the milk is secreted; thus new-born infants cannot retain the milk of a nurse who has given suck for a twelvemonth, on account of its spissitude.—4. In respect of *food or medicines*. Thus if a nurse eat garlic, the milk becomes highly impregnated with its odour, and is disagreeable. If she indulge too freely in the use of wine or beer, the infant becomes ill. From giving a purging medicine to a nurse, the child also is purged; and lastly, children affected with tormina of the bowels, arising from acids, are often cured by giving the nurse animal food.—5. In respect of the *affections of the mind*. There are frequent examples of infants being seized with convulsions from sucking mothers irritated by anger. An infant of one year old, while he sucked milk from his enraged mother, on a sudden was seized with a fatal hæmorrhage and died. Infants at the breast in a short time pine away, if the nurse be afflicted with grievous care; and there are also infants who after every coition of the mother, or even if she menstruate, are taken ill.

The use of the mother's milk is, 1. It affords the native aliment to the new-born infant, in which respect milk differs little from chyle. Those children are the strongest who are nourished the longest by the mother's milk. 2. The colostrum should not be rejected; for it relaxes the bowels, which in new-born infants ought to be open, to clear their intestines of the meconium. 3. Lactation defends the mother from a dangerous reflux of the milk into the blood, whence lacteal metastasis and leucorrhœa are so frequent in lying-in women who do not give suck. The motion of the milk also being hastened through the breast by the sucking of the child, prevents the very common induration of the breast, which arises in consequence of the milk being stagnated. 4. Men may live upon milk, unless they have been accustomed to the drinking of wine. For all nations, the Japanese alone excepted, use milk, and many live upon it alone. Lastly, for many diseases, especially the gout, scurvy, dysentery, and phthisical tabes of the different viscera, a milk diet is reckoned amongst the most efficacious remedies.

Asses milk.—This more nearly resembles human milk than any other. The cream is in small quantity: by agitation it gives a butter,

which is soft, white, and nearly tasteless. It soon becomes very rancid, owing probably to its retaining a portion of the acid. By standing it deposits much of the curd even before it becomes sour.

Goats milk.—This is very thick, yellowish, and pleasantly flavoured. It is somewhat denser than cow's milk; is remarkably thick and unctuous, and will keep a long time without growing sour, or sensibly changing. By agitation it gives a very firm, solid, and white butter. It abounds in curd: its sugar is small in quantity, but separates with ease.

Sheep's milk resembles cow's very closely in taste and appearance. It yields abundance of cream, which, by churning, affords much butter; but a butter that always remains soft. The quantity of curd is large, and it has a very fat and unctuous appearance, and a peculiar taste, which is always very distinguishable in ewe-milk cheese.

Mare's milk is thin and insipid, and does not coagulate with vinegar. It is remarkable for the small quantity of cream which it gives, and the extreme difficulty of separating the butter from it by agitation.

All these species of milk resemble each other essentially in the number and general chemical nature of the ingredients; but great diversity appears in their respective proportion, and, apparently, in the mode of their mixture. Thus, cow's and sheep's milk yield cream easily by repose, the consistence of which is greater than in the others, and the butter of which separates more perfectly. There is an equal difference in the consistence of the curd; that from cow's and sheep's milk being dense, and readily separating by the usual coagulating substances; while the curd from ass's and mare's milk always remains thin and of nearly a creamy consistence. The only general agreement which the authors of these experiments have been able to make on this subject is, that where the curd is tough and gelatinous the butter is readily separable from the cream, and all the constituent parts of the milk are more easily obtained by chemical means.

To MILK. *v. a.* (from the noun.) 1. To draw milk from the breast by the hand (*Pop.*). 2. To suck (*Shakspeare*).

MILK-TEETH. See TEETH.

MILK-VETCH. In botany. See ASTRAGALUS.

MILK-WOOD. In botany. See BROSIMUM.

MILK-WORT. In botany. See POLYGALA.

MILK-THISTLE. See CARDUUS.

MI'LKEN. *a.* (from *milk.*) Consisting of milk (*Temple*).

MI'LKER. *s.* (from *milk.*) One that milks animals (*Dryden*).

MI'LKINESS. *s.* (from *milky.*) Softness like that of milk; approach to the nature of milk (*Floyer*).

MI'LKLIVERED. *a.* (*milk* and *liver.*) Cowardly; timorous; fainthearted (*Shaks.*).

MI'LKMAID. *s.* (*milk* and *maid.*) Woman employed in the dairy (*Addison*).

MI'LKMAN. *s.* (*milk* and *man.*) A man who sells milk.

MI'LKPAIL. *s.* (*milk* and *pail.*) A vessel into which cows are milked (*Watts*).

MI'LKPAN. *s.* (*milk* and *pan.*) Vessel in which milk is kept in the dairy (*Bacon*).

MI'LKPOTTAGE. *s.* (*milk* and *pottage.*) Food made by boiling milk with water and oatmeal (*Locke*).

MI'LKSCORE. *s.* (*milk* and *score.*) Account of milk owed or scored on a board (*Addison*).

MI'LKSOP. *s.* (*milk* and *sop.*) A soft, mild, effeminate, feeble-minded man (*Spens.*).

MI'LKWHITE. *a.* (*milk* and *white.*) White as milk (*Dryden*).

MI'LKWOMAN. *s.* (*milk* and *woman.*) A woman whose business is to serve families with milk (*Arbuthnot*).

MI'LKY. *a.* (from *milk.*) 1. Made of milk. 2. Resembling milk (*Arbuthnot*). 3. Yielding milk (*Roscommon*). 4. Soft; gentle; tender; timorous (*Shakspeare*).

MILKY WAY, *Via Lactea*, or *Galaxy*, a broad track or path, encompassing the whole heavens, distinguishable by its white appearance, whence it obtains the name. It extends itself in some parts by a double path, but for the most part it is single. Its course lies through the constellations Cassiopeia, Cygnus, Aquila, Perseus, Andromede, part of Ophiucus and Gemini, in the northern hemisphere; and in the southern, it takes in part of Scorpio, Sagittarius, Centaurus, the Argo-navis, and the Ara. There are some traces of the same kind of light about the south pole, but they are small in comparison of this: these are called by some luminous spaces, and Magellanic clouds; but they seem to be of the same kind with the Milky way.

The Milky way has been ascribed to various causes. The ancients fabled, that it proceeded from a stream of milk, spilt from the breast of Juno, when she pushed away the infant Hercules, whom Jupiter laid to her breast to render him immortal. Some again, as Aristotle, &c. imagined that this path consisted only of a certain exhalation hanging in the air; while Metrodorus, and some Pythagoreans, thought the sun had once gone in this track, instead of the ecliptic; and consequently that its whiteness proceeds from the remains of his light. But it is now well known, by the help of telescopes, that this track in the heavens consists of an immense multitude of stars, seemingly very close together, whose mingled light gives this appearance of whiteness; by Milton beautifully described as a path "powdered with stars."

MILL. *s.* (μυλη; myln, Saxon.) An engine or fabric in which corn is ground to meal, or any other body is comminuted (*Sharp*).

To MILL. *v. a.* (from the noun; μυλλω) 1. To grind; to comminute. 2. To beat up

chocolate. 3. To stamp coin in the mints (*Addison*).

The first obvious method of reducing corn into flour for bread would be, by the simple expedient of pounding. And that was for ages the only one which was practised by the various descendants of Adam, and actually continued in use among the Romans below the reign of Vespasian. But the process was very early improved by the application of a grinding power, and the introduction of mill-stones. This, like most of the common refinements in domestic life, was probably the invention of the antediluvian world, and certainly practised in some of the earliest ages after it. And like most of them, it was equally known in the east and west. Hence the Gauls and Britons appear familiarly acquainted with the use of hand-mills before the time of their submission to the Romans; the Britons particularly distinguishing them, as the Highlanders and we distinguish them at present, by the simple appellations of *querns*, *carnes*, or *stones*. And to these the Romans added the very useful invention of water-mills. For this discovery the world is pretty certainly indebted to the genius of Italy; and the machine was not uncommon in the country at the conquest of Lancashire. This, therefore, the Romans would necessarily introduce with their many other refinements among us. And that they actually did, the British appellation of a water-mill fully suggests of itself; the *melin* of the Welsh and Cornish, the *mull*, *meil*, and *melin* of the Armoricans, and the Irish *muilean* and *muilind*, being all evidently derived from the Roman *mola*, and *molendinum*. The subject Britons universally adopted the Roman name, but applied it, as we their successors do, only to the Roman mill; and one of these was probably erected at every stationary city in the kingdom. One plainly was at Manchester, serving equally the purposes of the town and the accommodation of the garrison. And one alone would be sufficient, as the use of hand-mills remained very common in both, many having been found about the site of the station particularly; and the general practice having descended among us nearly to the present period. Such it would be peculiarly necessary to have in the camp, that the garrison might be provided against a siege. And the water-mill at Manchester was fixed immediately below the castle-field and the town, and on the channel of the Medlock. There, a little above the ancient ford, the sluice of it was accidentally discovered about 30 years ago. On the margin of dyer's-croft, and opposite to some new constructions, the current of the river, accidentally swelled with the rains, and obstructed by a dam, broke down the northern bank, swept away a large oak upon the edge of it, and disclosed a long tunnel in the rock below. This has been since laid open in part with a spade. It appeared entirely uncovered at the top, was about a yard in width, and another in depth, but gradually narrowed to the bottom. The sides showed every where the marks of the tool on the rock, and the course of it was parallel with the channel. It was bared by the flood about twenty-five yards only in length, but was evidently continued for several further; having originally begun, as the nature of the ground evinces, just above the large curve in the channel of the Medlock.

For the first five or six centuries of the Roman state, there were no public bread-bakers in the city of Rome. They were first introduced into it from the east at the conclusion of the war with Perseus, and about the year 167 before Christ. And, towards the close of the first century, the Roman families were supplied by them every morning with fresh loaves for breakfast. But the same custom, which prevailed originally among the Romans and many other nations, has continued nearly to the present time among the Mancunians. The providing of bread for every family was left entirely to the attention of the women in it. And it was baked upon stones, which the Welsh denominate *greidiols*, and we *gredles*. It appears, however, from the kiln-burnt pottery which has been discovered in the British sepulchres, and from the British appellation of an *odyn* or *oven* remaining among us at present, that furnaces for baking were generally known among the original Britons. An odyn would, therefore, be erected at the mansion of each British baron, for the use of himself and his retainers: and when he and they removed into the vicinity of a Roman station, the oven would be rebuilt with the mansion, and the public bakehouses of our towns commence at the first foundation of them One bakehouse would be constructed, as we have previously shown one mill to have been set up for the public service of all the Mancunian families. One oven and one mill appear to have been equally established in the town. And the inhabitants of it appear immemorially accustomed to bake at the one and grind at the other. Both, therefore, were in all probability constructed at the first introduction of water-mills and ovens into the country. The great similarity of the appointments refers the consideration directly to one and the same origin for them. And the general nature of all such institutions points immediately to the first and actual introduction of both. And, as the same establishments prevailed equally in other parts of the north, and pretty certainly obtained over all the extent of Roman Britain, the same erections were as certainly made at every stationary town in the kingdom.

For the description of different kinds of mills, see our articles CORN-MILL, BOLTING-MILL, FLOUR-MILL, OIL-MILL, ROLLING-MILL, WATER-MILL, WIND-MILL, &c.: and for the theory of mills, see the article MILL in Dr. Hutton's excellent Mathematical Dictionary; Gregory's Mechanics, vols. 1 and 2; Brewster's Ferguson; and Faber on Hydraulic Machines.

MILL (John), a learned English divine, born at Shap in Westmoreland, about 1645. In 1661 he was entered a servitor of Queen's

college, Oxford, of which he afterwards became fellow. In 1681 he took his degree of D.D. and about the same time was appointed chaplain to the king. In 1685 he was elected principal of Edmund hall. His edition of the Greek Testament, which will carry his name down to the latest posterity, was published about a fortnight before his death, an event that happened in 1707.

MILL (Henry), principal engineer to the New River company, was born in London about 1680, and educated at one of the universities. His skill in mechanics recommended him to the New River company, in whose service he was for many years before his death in 1780. He was employed in various other works, particularly in supplying the town of Northampton with water, for which he received the freedom of that corporation.

MILL-COGS. *s.* The denticulations on the circumference of wheels, by which they lock into other wheels (*Mortimer*).

MILL-DAM. *s.* The mound by which the water is kept up to raise it for the mill (*Mortimer*).

MILL-HORSE. *s.* Horse that turns a mill.

MILL-MOUNTAIN. See LINUM CATHARTICUM.

MILL-STONE, in a mineralogical view, is a species of the aggregate earth named arenarius or sand-stone. See ARENARIUS.

MILLEA. In botany, a genus of the class hexandria, order monogynia. Corol funnel-form, with a six-parted, flat border; anthers inserted in the throat of the corol; germ pedicelled; capsule superior. One species: a Mexican plant, with large white corol.

MILLEFOLIUM. (*millefolium*, from *mille*, a thousand, and *folium*, a leaf; so named from its numerous leaves). See MELISSA.

MILLEMORBIA. (*millemorbia*, from *mille*, a thousand, and *morbus*, a disease; so called from its use in many diseases.) See SCROPHULARIA VULGARIS.

MILLENA'RIAN. *s.* (from *millenarius*, Lat.) One who expects the millennium.

MI'LLENARY. *a.* (*millenarius*, Latin.) Consisting of a thousand (*Arbuthnot*).

MILLENER, or MILLINER, one who sells ribbands and dresses, particularly head-dresses for ladies; and who makes up those dresses.

The derivation of this word is much disputed. It cannot be from the French, as some pretend; for the French express the notion of millener by the circumlocution *merchande des modes*.

Littleton, in his English and Latin dictionary, published 1677, defines millener, "a jack of all trades;" q. d. *millenarius*, or *mille mercium venditor*; that is, "one who sells a thousand different sorts of things." This etymology seems fanciful: but, if he rightly understood the vulgar meaning of the word millener in his time, we must hold that it then implied what is now termed "a haberdasher of small wares," one who dealt in various articles of petty merchandise, and who did not make up the goods which he sold.

Before Littleton's time, however, a somewhat nicer characteristic than seems compatible with his notion appears to have belonged to them; for Shakspeare, in his Henry IV. makes Hotspur, when complaining of the daintiness of a courtier, say, "He was perfumed like a millener." The fact seems to be, that there were milleners of several kinds: as, horse-milleners, (for so those persons were called who make ornaments of coloured worsted for horses); haberdashers of small wares, the milleners of Littleton; and milleners such as those now peculiarly known by that name, whether male or female, and to whom Shakspeare's allusion seems most appropriate.

Lastly, Dr. Johnson, in his Dictionary, derives the word from *milaner*, an inhabitant of Milan, from whence people of this profession first came, as a *Lombard* is a banker.

MI'LLENIST. *s.* (from *mille*, Latin.) One that holds the millennium.

MILLENNIUM, "a thousand years;" generally employed to denote the thousand years during which, according to an ancient tradition in the church, grounded on some doubtful texts in the Apocalypse and other scriptures, our blessed Saviour shall reign with the faithful upon earth after the first resurrection, before the final completion of beatitude. Though there has been no age of the church in which the millennium was not admitted by individual divines of the first eminence, it is yet evident from the writings of Eusebius, Irenæus, Origen, and others among the ancients, as well as from the histories of Dupin, Mosheim, and all the moderns, that it was never adopted by the whole church, or made an article of the established creed in any nation.

About the middle of the fourth century the millenarians held the following tenets: 1st, That the city of Jerusalem should be rebuilt, and that the land of Judea should be the habitation of those who were to reign on earth 1000 years. 2dly, That the first resurrection was not to be confined to the martyrs; but that after the fall of Antichrist all the just were to rise, and all that were on the earth were continue for that space of time. 3dly, That Christ shall then come down from heaven, and be seen on earth, and reign there with his servants. 4thly, That the saints during this period shall enjoy all the delights of a terrestrial paradise.

These opinions were founded upon several passages of scripture which the millenarians among the fathers understood in no other than a literal sense, but which the moderns, who hold that opinion, consider as partly literal and partly metaphorical. Of these passages, that upon which the greatest stress has been laid, we believe to be the following:—"And I saw an angel come down from heaven, having the key of the bottomless pit, and a great chain in his hand. And he laid hold on the dragon,

that old serpent, which is the Devil and Satan, and bound him a thousand years, and cast him into the bottomless pit, and shut him up, and set a seal upon him, that he should deceive the nations no more till the thousand years should be fulfilled; and after that he must be loosed a little season. And I saw thrones, and they sat upon them, and judgment was given unto them: and I saw the souls of them that were beheaded for the witness of Jesus, and for the word of God, and which had not worshipped the beast, neither his image, neither had received his mark upon their foreheads, or in their hands; and they lived and reigned with Christ a thousand years. But the rest of the dead lived not again till the thousand years were finished. This is the first resurrection." Rev. xx. 1—6. This passage all the ancient millenarians took in a sense grossly literal: and taught, that during the millennium the saints on earth were to enjoy every bodily delight. The moderns, on the other hand, consider the power and pleasure of this kingdom as wholly spiritual; and they represent them as not to commence till after the conflagration of the present earth. But that this last supposition is a mistake, the very next verse except one assures us: for we are there told, that "when the thousand years are expired, Satan shall be loosed out of his prison, and shall go out to deceive the nations which are in the four quarters of the earth;" and we have no reason to believe that he will have such power or such liberty in "the new heavens and the new earth wherein dwelleth righteousness."

For this and other reasons, which our limits will not permit us to enumerate, the most judicious critics contend, that the prophecies of the millennium point not to a resurrection of martyrs and other just men to reign with Christ a thousand years in a visible kingdom upon earth, but to that state of the Christian church, which, for a thousand years before the general judgment, will be so pure and so widely extended, that, when compared with the state of the world in the ages preceding, it may, in the language of scripture, be called a resurrection from the dead. In support of this interpretation they quote two passages from St. Paul, in which a conversion from Paganism to Christianity, and a reformation of life, is called a resurrection from the dead: —"Neither yield ye your members as instruments of unrighteousness unto sin; but yield yourselves unto God as those that are alive from the dead." Rom. vi. 13. And again, "Wherefore he saith, Awake thou that sleepest, and arise from the dead, and Christ shall give thee light." Eph. v. 14. It is likewise to be observed, that in all the descriptions of the resurrection and future judgment which are given us at such length in the gospels and epistles, there is no mention made of a first and second resurrection at the distance of a thousand years from each other. There is indeed an order in the resurrection: for we are told (1 Cor. xv. 23.) that "every man shall rise in his own order; Christ the first fruits, afterwards they that are Christ's at his coming, &c." But were the millenarian hypothesis well founded, the words should rather have run thus. "Christ the first fruits, then the martyrs at his coming, and a thousand years afterwards the residue of mankind. Then cometh the end," &c.

These arguments strongly incline us to believe, that, by the reign of Christ and the saints for a thousand years upon earth, nothing more is meant than that before the general judgment the Jews shall be converted, genuine Christianity be diffused through all nations, and mankind enjoy that peace and happiness which the faith and precepts of the gospel are calculated to confer on all by whom they are sincerely embraced.

Our Saviour's own account of his religion is, that from a small beginning it will increase to the full harvest. The millennium therefore is to be considered as the full effect of the Christian principles in the hearts of men, and over the whole world; and the divines who have treated on this subject prove satisfactorily that this is to be expected from the facts which have already existed, and from the importance of the Christian doctrine.

MILLENNIAL. *a.* (from *millennium*, Latin.) Pertaining to the millennium.

MILLEPEDÆ. See MILLEPEDES.

MILLEPEDES. (*millepes*, from *mille*, a thousand, and *pes*, a foot; named from their numerous feet.) Millipedæ. Wood-lice. The systematic name of this insect is oniscus armadillo of Linnéus. These insects, though they obtain a place in the pharmacopœias, are very seldom used medicinally in this country; they appear to act as stimulants and slight diuretics, and for this purpose they ought to be administered in a much greater dose than is usually prescribed. The expressed juice, or forty or fifty living millepedes, given in a mild drink, is said to cure very obstinate jaundices. See ONISCUS.

MILLEPORA. MILLEPÆ. In zoology, a genus of the class vermes, order zoophyta. Animal an hydra, or polype; corol mostly branched and covered with cylindrical turbinate pores. Thirty-four species, chiefly inhabitants of the Mediterranean; several found on our own coasts, especially in Cornwall; and a few scattered through the seas of America, India, and Polynesia. The mode of propagation and support is similar to that of the MADREPORES, to which article the reader may revert. The following are chiefly worthy of notice.

1. M. mineacea. Very minute, branching into small lobes, and covered with very small pores. Inhabits the Mediterranean and Indian seas: a beautiful little coral, and the smallest of its genus, being seldom above a quarter of an inch high: the whole surface when magnified appears full of minute, white, blind spiracles, and on the tops of the lobes are several scattered holes surmounted with a margin; the base is broad, and by this it adheres to shells, rocks, and other corals.

2. M. cervicornis. A little compressed, dichotomous, with cells on both sides, and tubular, somewhat prominent florets. Inhabits the Mediterranean and Cornish coasts; from five to six inches high; reddish, or yellowish-brown, within whitish; branched like the horns of a stag, and appearing as if covered with varnish: a few of the pores are divided at the base, narrow, and of brittle texture.

3. M. cellulosa. Membranaceous, reticulate, funnel-form, irregularly waved and plaited at the margin, with numerous pores on one side. Inhabits the Mediterranean and European seas, fixed to marine substances, and resembles a piece of lace, consisting of a flat, erect, undulating membrane, covered with large, regular perforations; sometimes cup-shaped, at other times running into loose folds with a waved margin like a ruffle: about three inches high, solid, brittle, white, or yellowish-grey, with very vivacious polypes.

4. M. polymorpha. Crustaceous, solid, irregularly shaped, but generally branched and tuberculate, and without visible pores. Inhabits most European seas: like the isis, and various other zoophytes, it was formerly employed as an asborbent: and is the common corol of the shops, formed into toys for children: in many places it grows in such abundance that it is burnt for manure; colour red, yellowish, greenish, cinereous, but seldom white; sometimes it is shaped like the kernel of a walnut; often in large compressed masses; at other times, botryoidal; but most frequently found in short, irregular ramifications of a chalky tuberculate appearance, and stony substance.

5. M. violacea. Flat, branching, with erect, flexuous, round ramifications a little compressed, and a porous suture encompassing the margin. Inhabits the South Sea islands; about three inches high; fine violet blue, with two rows of small pores on each side the margin, besides the line of larger ones surrounding it: surface rough, with here and there clusters of little studs.

MILLEPORE, in helminthology. See Millepora.

MI'LLER. s. (from *mill.*) One who attends a mill (*Brown*).

Miller (James), an English dramatic writer, was born in Dorsetshire in 1703. He was designed for trade, but not liking that employment he went to Wadham college, Oxford, and entered into orders. While at the university he wrote a famous comedy, called The Humours of Oxford, performed in 1729. He wrote several other pieces, the last of which was Mahomet, a tragedy; during the run of which the author died in 1743. He also published a volume of sermons, and some poems.

Miller (Philip), a famous gardener, was born in Scotland in 1691. His father was gardener to the apothecaries' company at Chelsea, to which place Philip succeeded in 1722. He was a fellow of the royal society, and published several works, the greatest of which is his Gardener's Dictionary in folio. He died in 1771.

MILLERIA, in botany, a genus of the class syngenesia, order polygamia neupatria. Receptacle naked; downless; calyx one-leafed, two or three parted; florets half radiate. Four species, natives of South America.

MILLER'S THUMB, in ichthyology. See Cottus.

MILLE'SIMAL. a. (*millesimus*, Lat.) Thousandth; consisting of thousandth parts (*Watts*).

MILLET. In botany. See Panicum.

Millet-grass. See Holcus.

MILLETIERE (Theophilus Brachet, sieur de la), a protestant advocate, who turned divine, and wrote a book encouraging the reformed at Rochelle to take up arms in defence of their religion. In 1645 he renounced the protestant religion and embraced popery. He wrote several polemical books, and earnestly recommended a reunion between the catholics and calvinists. He died in 1665, hated by both parties.

MI'LLINER. See Millener.

MILLING OF CLOTH. See Fulling and Cloth.

MILLWORT. See Glaux.

MI'LLION. s. (*million*, French.) 1. The number of a hundred myriads, or ten hundred thousand (*Shakspeare*). 2. A proverbial name for any very great number (*Locke*).

MILLIONTH. a. (from *million.*) The ten hundred thousandth (*Bentley*).

MILLOT (Claude Francis Xavier), a French historian, was born at Besançon in 1726, and for some time belonged to the order of jesuits. He was appointed professor of history at Parma, which office he discharged with great reputation for several years. On his return to Paris he became tutor to the duke of Enghein. He died in 1785. He wrote—1. Elemens de l'Histoire de France, depuis Clovis jusqu'à Louis XIV. 3 vols. in 12mo. The author, selecting the most curious and important facts, has suppressed every thing foreign to the subject, and has not only arranged the materials in their proper order, but chosen them with the greatest judgment. Querlon thought this the best abridgment which we have of the history of France, and preferred it to that of the president Henault.—2. Elemens de l'Histoire d'Angleterre, depuis son origine sous les Romains jusqu'à George II. 3 vols. 12mo. A certain critic maintains, that this work is merely a counterfeit of Voltaire's general history. But this censure is altogether unjust. The ancient history in this work is wholly composed by the Abbé Millot; and, no less than the modern part, discovers his abilities in the choice of facts, in divesting them of useless circumstances, in relating them without prejudice, and in adorning them with judicious reflections.—4. Histoire des Troubadours, three vols. 12mo, compiled from the manuscripts of M. de Sainte Palaie. 5. Memoires Politiques et Militaires, pour servir à l'Histoire de Louis XIV, et de Louis XV,

6 vols. 12mo. And various philosophical Discourses.

MILO, a celebrated athlete of Crotona in Italy. It is said that he carried on his shoulders a young bullock four years old, for above forty yards, and afterwards killed it with one blow of his fist, and ate it up in one day. He was seven times crowned at the Pythian games, and six at Olympia. *Ovid. Cic.* &c.—2. T. Annius, a native of Lanuvium, who attempted to obtain the consulship at Rome. Clodius the tribune opposed his views, yet Milo would have succeeded had not an unfortunate rencontre taken place between his suite and that of Clodius as he was going to the country. Clodius and eleven of his servants were killed, and the body of the murdered tribune was carried to Rome and exposed to public view. Cicero undertook the defence of Milo, but with no effect; he was condemned and banished to Massilia.—3. A general of the forces of Pyrrhus. He was made governor of Tarentum, and that he might be reminded of his duty to his sovereign, Pyrrhus sent him as a present a chain, which was covered with the skin of Nicias the physician, who had perfidiously offered the Romans to poison his royal master for a sum of money.

MILO, an island of the Archipelago, about 50 miles in circumference. It has one of the largest and most commodious harbours of the Mediterranean, which serves as a retreat for all vessels that go to, or come from, the Levant. The inhabitants, who are all Greeks, except the cadi, are good sailors. Here are two bishops, one of the Greek, and the other of the Latin church.

MILO, the capital of the above island, is situated on the eastern part of it, and contains about 5000 inhabitants. It is 60 miles N. of Candia. Lat. 36. 41 N. Lon. 25. 6 E.

MILT, in anatomy, a popular name for the spleen. See ANATOMY.

MILT, or MELT, in natural history, the soft roe in fishes; thus called from its yielding, by expression, a whitish juice resembling milk. (See ROE.) The milt is properly the seed or spermatic part of the male fish. The milt of a carp is reckoned a choice bit. It consists of two long whitish irregular bodies, each included in a very thin fine membrane. M. Petit considers them as the testicles of the fish wherein the seed is preserved; the lower part, next the anus, he takes for the vesiculæ seminales.

To MILT. *v. a.* (from the noun.) To impregnate the roe or spawn of the female fish.

MILT-WASTE. See ASPLENIUM.

MILTHORP, a port-town of Westmoreland, at the mouth of the Can, five miles from Kendal. It is the only sea-port in the county; and goods are brought hither in small vessels from Grange in Lancashire. Here are two paper-mills. It has a market on Friday, and a fair on old May-day; and there is a good stone bridge over the river Betha, which runs through the town.

MILTENBURG, a town of Franconia, in Germany, 20 miles S. E. of Aschaffenburg. Lat. 49. 46 N. Lon. 9. 19 E.

MILTIADES. There were two of this name recorded in ancient history, both Athenians; one the son of Cypselus, the other the celebrated captain, the son of Cymon, who made himself absolute in the Chersonesus, whither he was sent by the Athenians, and who in some time after signalized himself so much by the victory at Marathon over the Persian army. (See MARATHON.) Some time after this battle Miltiades was entrusted with a fleet of 70 ships, and ordered to punish those islands which had revolted to the Persians. He was successful at first, but a sudden report that the Persian fleet was coming to attack him changed his operations as he was besieging Paros. He raised the siege and returned to Athens, where he was accused of treason, and particularly of holding correspondence with the enemy. A wound which he had received before Paros detained him at home from making his defence, and his enemies taking advantage of his absence, he was condemned to death, but the rigour of the sentence was retracted on the recollection of his great services to the Athenians; he was put into prison till he had paid a fine of 50 talents to the state. His inability detained him in confinement, and soon after his wounds became incurable, and he died about 489 years before the Christian era. His body was ransomed by his son Cimon, who was obliged to borrow and pay the 50 talents, to give his father a decent burial.

MILTON, an ancient town of Dorsetshire, having a market on Tuesdays. This place was famous for its abbey, which is now in ruins. It is 113 miles W. by S. of London.

MILTON, a town of Kent, having a market on Saturdays. It is seated on a creek of the river Medway, near the isle of Sheppey, and is much noted for the excellence of its oysters. It is governed by a constable, and is 42 miles E. of London.

MILTON (John), the most illustrious of the English poets, was descended of a genteel family, seated at a place of their own name, viz. Milton, in Oxfordshire. He was born December 9, 1608, and received his first rudiments of education under the care of his parents, assisted by a private tutor. He afterwards passed some time at St. Paul's school, London; in which city his father had settled, being engaged in the business of a scrivener. At the age of 17 he was sent to Christ's college, Cambridge, where he made a great progress in all parts of academical learning, but his chief delight was in poetry. In 1628, he proceeded bachelor of arts, having performed his exercise for it with great applause. His father designed him for the church; but the young gentleman's attachment to the muses was so strong, that it became impossible to engage him in any other pursuits. In 1632 he took the degree of master of arts; and having now spent as much time in the university as became a person who determined not to engage in

any of the three professions, he left the college, greatly regretted by his acquaintance, but highly displeased with the usual method of training up youth there for the study of divinity; and being much out of humour with the public administration of ecclesiastical affairs, he grew dissatisfied with the established form of church government, and disliked the whole plan of education practised in the university. His parents, who now dwelt at Horton, near Colnbrook, in Buckinghamshire, received him with unabated affection, notwithstanding he had thwarted their views of providing for him in the church; and they amply indulged him in his love of retirement, wherein he enriched his mind with the choicest stores of Grecian and Roman literature: and his poems of Comus, L'Allegro, Il Penseroso, and Lycidas, all written at this time, would have been sufficient, had he never produced any thing more considerable, to have transmitted his fame to latest posterity. However, he was not so absorbed in his studies as not to make frequent excursions to London; neither did so much excellence pass unnoticed among his neighbours in the country, with the most distinguished of whom he sometimes chose to relax his mind, and improve his acquaintance with the world as well as with books.—After five years spent in this manner, he obtained his father's permission to travel for farther improvement. At Paris he became acquainted with the celebrated Hugo Grotius: and from thence travelling into Italy, he was every where caressed by persons of the most eminent quality and learning.

Upon his return home, he set up a genteel academy in Aldersgate-street.—In 1641 he began to draw his pen in defence of the presbyterian party, and the next year he married the daughter of Richard Powell, Esq. of Forest-Hill in Oxfordshire. This lady, however, whether from a difference on account of party, her father being a zealous royalist, or some other cause, soon thought proper to return to her relations; which so incensed her husband, that he resolved never to take her again, and wrote and published several tracts in defence of the doctrine and discipline of divorce. He even made his addresses to another lady; but this incident proved the means of a reconciliation with Mrs. Milton.

In 1644 he wrote his Tract upon Education; and the restraint on the liberty of the press being continued by act of parliament, he wrote boldly and nobly against that restraint. In 1645 he published his juvenile poems; and about two years after, on the death of his father, he took a smaller house in High Holborn, the back of which opened into Lincoln's-Inn Fields.—Here he quietly prosecuted his studies, till the fatal catastrophe and death of Charles I.; on which occasion he published his Tenure of Kings and Magistrates, in justification of the fact. He was now taken into the service of the commonwealth, and made Latin secretary to the council of state, who resolved neither to write to others abroad, nor to receive any answers, except in the Latin tongue, which was common to them all. The famous Εικων βασιλικη coming out about the same time, our author, by command, wrote and published his Iconoclastes the same year. It was also by order of his masters, backed by the reward of 1000*l.* that in 1651 he published his celebrated piece, entitled Pro Populo Anglicano Defensio. "A Defence of the People of England, in answer to Salmatius's Defence of the King;" which performance spread his fame over all Europe.—He now dwelt in a pleasant house, with a garden in Petty France, Westminster, opening into St. James's Park. In 1652 he buried his wife, who died not long after the delivery of her fourth child; and about the same time he also lost his eye-sight, by a gutta serena, which had been growing upon him many years.

Cromwell took the reins of government into his own hands in the year 1653; but Milton still held his office. His leisure hours he employed in prosecuting his studies; wherein he was so far from being discouraged by the loss of his sight, that he even conceived hopes this misfortune would add new vigour to his genius; which, in fact, seems to have been the case. Thus animated, he again ventured upon matrimony: his second lady was the daughter of Captain Woodstock of Hackney; she died in child-bed about a year after. On the deposition of the protector, Richard Cromwell, and on the return of the long parliament, Milton being still continued secretary, he appeared again in print, pleading for a farther reformation of the laws relating to religion; and, during the anarchy that ensued, he drew up several schemes for re-establishing the commonwealth, exerting all his faculties to prevent the return of Charles II. England's destiny, however, and Charles's good fortune, prevailing, our author chose to consult his safety, and retired to a friend's house in Bartholomew-close. A particular prosecution was intended against him; but the just esteem to which his admirable genius and extraordinary accomplishments entitled him had raised him so many friends, even among those of the opposite party, that he was included in the general amnesty.

This storm over, he married a third wife, Elizabeth, daughter of Mr. Minshall, a Cheshire gentleman; and not long after he took a house in the Artillery Walk leading to Bunhill-fields. This was his last stage: here he sat down for a longer continuance than he had been able to do any where; and though he had lost his fortune (for every thing belonging to him went to wreck at the Restoration), he did not lose his taste for literature, but continued his studies with almost as much ardour as ever; and applied himself particularly to the finishing his grand work, the Paradise Lost, one of the noblest poems that ever was produced by human genius.—It was published in 1667, and his Paradise Regained came out in 1670.—This latter work fell short of the excellence of the former production; although, were it not for the transcendent merit of

Paradise Lost, the second composition would doubtless have stood foremost in the rank of English epic poems. After this he published many pieces in prose, for which we refer our readers to the edition of his Historical, Poetical, and Miscellaneous Works, printed by Millar, in 2 vols. 4to, in 1753.

In 1674 this great man paid the last debt to nature at his house in Bunhill-fields, in the 66th year of his age; and was interred on the 12th of November, in the chancel of St. Giles's, Cripplegate. A decent monument was erected to his memory, in 1737, in Westminster abbey, by Mr. Benson, one of the auditors of the imprest. His person was remarkably handsome, but his constitution was tender.

Memoirs of the life of Milton have been ably written by Mr. Hayley, Dr. Symonds, and others: but one of the most interesting sketches of this kind, both as it regards biography and criticism, is that by Dr. Johnson. It displays the great powers, and unfortunately at the same time the great prejudices, of that learned man; yet we wish we had room to select more than two or three of its characteristic passages.

Dryden remarks that Milton has some flats among his elevations. But says Johnson, "this is only to say, that all the parts are not equal. In every work, one part must be for the sake of others; a palace must have passages; a poem must have transitions. It is no more to be required that wit should be always blazing, than that the sun should always stand at noon. In a great work there is a vicissitude of luminous and opaque parts, as there is in the world a succession of day and night. Milton, when he has expatiated in the sky, may be allowed sometimes to revisit earth; for what other author ever soared so high, or sustained his flight so long!"

Once more, "Milton was naturally a thinker for himself, confident of his own abilities, and disdainful of help or hindrance: he did not refuse admission to the thoughts or images of his predecessors, but he did not seek them. From his contemporaries he neither courted nor received support; there is in his writings nothing by which the pride of other authors might be gratified, or favour gained; no exchange of praise, nor solicitations of support. His great works were performed under discountenance, and in his blindness; but difficulties vanished at his touch: he was born for whatever is arduous; and Paradise Lost is not the greatest of heroic poems, only because it is not the first."

Again, "The characteristic quality of his poem is sublimity. He sometimes descends to the elegant, but his element is the great. He can occasionally invest himself with grace, but his natural part is gigantic loftiness. He can please when pleasure is required; but it is his peculiar power to astonish.

"He seems to have been well acquainted with his own genius, and to know what it was that nature had bestowed upon him more bountifully than upon others, the power of displaying the vast, illuminating the splendid, exposing the awful, darkening the gloomy, and aggravating the dreadful: he therefore chose a subject on which too much could not be said, on which he might tire his fancy without the censure of extravagance.

"The appearances of nature, and the occurrences of life, did not satiate his appetite for greatness. To paint things as they are requires a minute attention, and employs the memory rather than the fancy. Milton's delight was to sport in the wide regions of possibility; reality was a scene too narrow for his mind. He sent his faculties out upon discovery, into worlds where only imagination can travel, and delighted to form new modes of existence, and furnish sentiment and action to superior beings, to trace the counsels of hell, or accompany the choirs of heaven."

Lastly, "In Milton every line breathes sanctity of thought, and purity of manners, except when the train of the narration requires the introduction of the rebellious spirits; and even they are compelled to acknowledge their subjection to God, in such a manner as excites reverence, and confirms piety."

MIME. *s.* (μιμος.) A buffoon who practises gesticulations, either representative of some action, or merely contrived to raise mirth (*B. Jonson*).

To MIME. *v. n.* To play the mime (*B. Jon.*)

MI'MER. *s.* (from *mime*.) A mimic (*Milt.*)

MI'MICAL. *a.* (*mimicus*, Latin.) Imitative; befitting a mimic; acting the mimic (*Dryden*).

MI'MIC. *a.* (*mimicus*, Latin.) Imitative (*Swift*).

To MI'MIC. *v. a.* (from the noun.) To imitate as a buffoon; to ridicule by a burlesque imitation (*Granville*).

MI'MICALLY. *ad.* In imitation; in a mimical manner

MIMIC. *s.* (*mimicus*, Latin.) 1. A ludicrous imitator; a buffoon who copies another's act or manner (*Prior*). 2. A mean or servile imitator.

MI'MICRY. *s.* (from *mimic*.) Burlesque imitation (*Spectator*).

MIMNERMUS, a Greek poet and musician of Colophon in the age of Solon. He chiefly excelled in elegiac poetry, whence some have attributed the invention of it to him In the expression of love, Propertius prefers him to Homer, as this verse shews:

Plus in amore valet Mimnermi versus Homero. Lib. i. Eleg. 9. v. 11.

And Horace bears testimony to his abilities, in describing that seducing passion:

Si Mimnermus uti censet, sine amore jocisque
Nil est jucundum, vivas in amore jocisque.
Epist. vi. lib. i. v. 65.

If, as wise Mimnermus said,
Life unblest with love and joy
Ranks us with the senseless dead,
Let these gifts each hour employ.

Alluding to some much-admired lines of this

Greek poet, which have been preserved by Stobæus.

Τις δε βιος, τι δε τερπνον, ατερ χρυσης Αφροδιτης, &c.

What is life and all its pride,
If love and pleasure be denied?
Snatch, snatch me hence, ye fates, whene'er
The am'rous bliss I cease to share.
Oh let us crop each fragrant flow'r
While youth and vigour give us pow'r:
For frozen age will soon destroy
The force to give or take a joy;
And then, a prey to pain and care,
Detested by the young and fair,
The sun's blest beams will hateful grow,
And only shine on scenes of woe.

MIMO'GRAPHER. *s.* (*mimus* and γράφω.) A writer of farces.

MIMO'SA. Sensitive plant. In botany, a genus of the class polygamia, order monœcia. Calyx five-toothed; corol five-cleft; stamens five or more; style one; stigma truncate; legume various. Eighty-five species, scattered over the warm climates of the globe. They may be thus subdivided:

A. Leaves simple.
B. Leaves simply-pinnate.
C. Leaves bigemminate, or tergeminate.
D. Leaves conjugate, and also pinnate.
E. Leaves doubly-pinnate. This subdivision embraces more than half the genus. The following are the chief species.

1. M. sensitiva. Common sensitive plant. Prickly: partial leaflets two-pair; the innermost very small: flowers purple, in roundish heads, succeeded by broad, flat jointed pods, in radiated clusters. The leaves and foot-stalks recede from the touch. A native of Brazil.

2. M. pudica. Bashful sensitive plant. Prickly: leaves somewhat digitate; stem bristly. Peculiarly sensitive to the approach of the hand, both in stalk and leaves. A native of Brazil.

3 M. viva. Lively mimosa. Unarmed; partial leaflets four pair, roundish; stem herbaceous, unarmed. A native of Jamaica; retaining the letters or name of a person for several minutes after such letters have been run over the leaves with a stick.

4. M. scandens. Cacoons, or Mafotoo wyth. Unarmed; leaves ending in a tendril; leaflets two pair. A native of both the Indies: its pod is eight or nine feet long, the largest and longast in botany, containing from ten to fifteen seeds.

5. M. catechu. Spines stipular; leaves many pair; glands of the partial ones solitary; spikes filiform, axillary, in pairs or threes, peduncled. A native of Hindustan, from which the drug called terra japonica is obtained by a decoction of the wood. See TERRA JAPONICA and CATECHU.

6. M. nilotica. Spines stipular, spreading; outer partial leaves separated by a gland; spikes globular, peduncled. A native tree of Arabia; about fifteen feet high, with a lupin-like pod, containing flattish brown seeds. From the branches and stem exudes the gum Arabic of the shops. See the article ARABICUM GUMMI.

7. M. Senegal. Spines in threes, the middle one reflected; flowers in spikes. A native of Arabia and Africa. The gum Senegal exudes from it; which has a close resemblance to gum Arabic. See the article GUMMI SENEGALENSE.

The three last species are strictly acacias: the nilotic mimosa is the true acacia or Egyptian thorn. But this genus in the Linnéan system comprehends as well the acacia and inga tribes, as the mimosas of other authors, all of which are too numerous to be particularly detailed.

The manner of propagating acacias is to sow their seeds in a hot-bed in spring; they will soon appear above the ground, and are then to be transplanted. For this purpose, another hot-bed must be prepared, into which must be plunged as many small pots as there is occasion for. These must be first filled with earth, and when they have stood twenty-four hours, this earth will be of a proper warmth. Then the plants are to be raised gently out of the first hot-bed, and planted one in the middle of each pot, and watered gently to settle the earth to their roots. The bed is then to be shaded with mats till they have taken root; and after this air must be given them, as they are able to bear it, by raising the glasses which cover the beds. There are two kinds, called the locust tree and the water acacia of Carolina, which, with the other hardier kinds, may be wholly uncovered in the hot-bed by midsummer. The first and second winter, these should be sheltered in a common hot-bed frame, till they are grown woody; and after this, they may be taken out of the pots in the spring of the year, and planted in the open ground, where they are intended to stand; which should always be in a wilderness or clump of trees, where they may be sheltered from the wind, the violence of which is otherwise apt to split them. When they are eight or ten feet high, they will make very vigorous shoots, which should be annually shortened, that the heads of the trees may not become open and naked. They love a loose and somewhat moist soil.

The other and tender kinds of acacia should be kept in the hot-beds till July, and after this be exposed to the air by degrees, though the glasses should not be removed from them wholly for the first year. These must be set in a stove the first and second winters; but when they are grown woody, they will live in a good green-house, and may be exposed in summer, as myrtles, orange-trees, and the like. They must be very little watered in winter; especially those which shed their leaves. The tenderest kinds of all, which are the true Egyptian acacia, the branched-leafed acacia, with twisted pods, and the large four-leaved acacia with twisted pods, must have a hot-bed of tanner's bark, and be shifted into larger pots, as they increase in bulk. The earth for these must be somewhat sandy; and great care must

be taken not to give them too large pots. The first of these three may, when grown woody, be set in a common stove, among viburnums, and similar plants; but the other two must have a bark-stove in winter: nor should they be exposed to the open air in summer, at least till they are four or five years old. In winter, these are to have very little water; but in summer they require frequent refreshings.

The inga may be propagated by seeds, in the manner directed for the acacia, only that the plants being too tender to endure the open air of this country, must not be removed out of the stove, even in the warmest part of the year; but they are only preserved in curious gardens, for the sake of variety. The sensitive plant, or the mimosa, strictly so called, may be propagated by seeds in the same manner with the inga, and other natives of warm climates.

The sensitive plant is so denominated, from its remarkable property of receding from the touch, and giving signs, as it were, of animal life and sensation; this motion it performs by means of three distinct articulations, viz. of a single leaf with its pedicle, of the pedicle to its branch, and of the branch to the trunk, or main stem; the primary motion of all which is the closing of the two halves of the leaf on its rib; then the rib or pedicle itself closes; and if the motion with which the plant is moved be very strong, the very branches have the sensation propagated to them, and apply themselves to the main stem, as the simple leaves did before to their ribs, and these ribs to their branches; so that the whole plant, in this state, forms itself, from a very complexly branched figure, into a sort of straight, cylindrical one.

MIMULUS. Monkey-flower. In botany, a genus of the class didynamia, order angiospermia. Calyx five-toothed, prismatic; the upper lip folded back at the sides; capsule two-celled; many seeded. Four species: natives of North or South America, with blue or yellow flowers.

MIMUSOP. In botany, a genus of the class octandria, order digynia. Calyx five-leaved; corolless: capsule one-celled; three-valved; seeds a few. Three species: herbs of Spain.

MINA, or MANEH, a species of money, which properly signifies one part or ounce. It is observed that this word occurs only in the books of Kings, Chronicles, Ezra, and Ezekiel. This prophet (xlv. 12.) tells us, that the minah or maneh was valued at 60 shekels, which in gold make of our English money about 54¾ pounds, and in silver almost seven pounds. Thus for the Hebrew maneh. But the Greek or Attic mina, which is probably that mentioned in the books of the Maccabees and in the New Testament, is valued at 100 drachmæ, or about 2*l.* 17*s.* sterling. There was also a lesser mina, which was valued at 75 drachmæ.

MINA'CIOUS. *a.* (*minax.* Lat.) Full of threats.

MINA'CITY. *s.* (*from minax,* Lat.) Disposition to use threats.

MINAGNGHINIM, a pulsatile instrument of music, among the Hebrews, which was a square table of wood fitted with a handle; over this table was stretched an iron chain, or hempen cord, passing through balls of wood or brass, which struck against the table when the instrument was shook, and occasioned a clear sound, which might be heard at a great distance.

MI'NATORY. *a.* (*minor,* Latin.) Threatening (*Bacon*).

To MINCE. *v. a.* (from *minish.*) 1. To cut into small parts (*South*). 2. To mention any thing scrupulously, by a little at a time; to palliate (*Woodward*). 3. To speak with affected softness; to clip the words (*Shakspeare*).

To MINCE. *v. n.* 1. To walk nicely by short steps (*Pope*). 2. To speak small and imperfectly (*Dryden*).

MINCHA, in the Jewish customs, offerings of meal, cakes, or biscuits, made in the temple of the Lord. The Seventy have sometimes preserved this word in their translation; but instead of *mincha* they read *manna*, which doubtless was the received pronunciation in their time.

MINCHING HAMPTON, a town of Gloucestershire, 20 miles from Bath and Bristol, and near 90 from London, with a market on Tuesdays, and two fairs. The parish is pretty large, being bounded on the north by the Stroud, and on the south by the brook Avening; and has 12 hamlets belonging to it, with a common called Amberley. Here is a good large rectory church, built in form of a cross, and worth 200*l.* a-year. Near it are very large camps, with deep trenches; and near Dunkirk in this parish are fulling-mills.

MI'NCINGLY. *ad.* (from *mince.*) In small parts; not fully (*Hooker*).

MINCIUS, a river of the Transpadana; running from, or rather transmitted through, the Lacus Benacus, from north to south, into the Padus; but originally rising in the Rhetian Alps. Now Mincio or Menzo, running through the duchy of Mantua into the Po.

MIND. *s.* (ᵹemynd, Saxon.) 1. The intelligent power (*Shakspeare*). 2. Intellectual capacity (*Cowley*). 3. Liking; choice; inclination; propension; affection (*Hooker*). 4. Thoughts; sentiments (*Dryden*). 5. Opinion (*Granville*). 6. Memory; remembrance.

To MIND. *v. a.* (from the noun.) 1. To mark; to attend (*Roscommon*). 2. To put in mind; to remind (*Burnet*).

To MIND. *v. n.* To incline; to be disposed (*Spenser*).

MINDANAO, the largest of the Philippine Islands, in Asia, except Manilla. It is almost the only one that is not subject to Spain; its length being about 200 miles, and its breadth 150. The inhabitants are of a very different description from those of the other Philippine Islands. Those of the inland country are supposed to be the ancient pagan inhabitants, whom the Mahometans, that possess the coasts, have driven up to the mountains. The air of

Mindanao is not excessively hot, though it lies within six degrees of the equator, as it is refreshed by the sea-breezes on every side in the day-time. The middle of the country is woody and mountainous: but between the hills are rich valleys, and near the sea-coast the country is generally flat. It produces rice, and such fruits as grow between the tropics. They have also libby or sago trees; of the pith of which they make bread. Great quantities of it are exported, after it is dried and drained like seed. The plantain wood is bea...l here, and in great perfection. It is their principal food, and they also make their drink of it. In the reign of Philip II. king of Spain, Don Lewis de Velasco, viceroy of Mexico, sent Michael Lopez de la Gaspes, with a fleet and force sufficient to make a conquest of these islands, which he afterwards named the Philippines, in honour of the above monarch.

The city of Magindanao is situated on the south east side of the island, has a river capable of admitting small vessels, and carries on a considerable trade with Manilla, Sooloo, Borneo, and the Moluccas. Their exports are rice, tobacco, bees-wax, and spices; in return for which they receive coarse cloths of Coromandel, China-ware, and opium. The village or town of Samboingan is situated on the banks of a small rivulet, which empties itself immediately into the sea, and is agreeably shaded by groves of cocoa trees. The number of its inhabitants are about 1000, among which are included the officers, soldiers, and their respective families. In its environs there are several small look-out houses, erected on posts of twelve feet high, in all of which a constant guard is kept; so that it appears as if the Spaniards were in a continual state of enmity with the natives. The houses are built of those simple materials which are of very general use in the eastern seas. They are erected on posts, and built of bamboo, covered with mats; the lower apartments serve for their hogs, cattle, and poultry, and the upper ones are occupied by the family. Lon. 125. 0 W. Lat. 6. 0 N.

MI'NDED. *a.* (from *mind.*) Disposed; inclined; affected (*Tillotson*).

MINDELHEIM, a town of Suabia, with a castle. It is the capital of a small territory between the rivers Iller and Lech, subject to the house of Bavaria. It was taken by the Austrians, after the battle of Blenheim, who erected it into a principality in favour of the duke of Marlborough; but it returned to the house of Bavaria, by the treaty of Rastadt. It is 30 miles S.E. of Ulm. Lon 10. 42 E. Lat. 48. 3. N.

MINDEN, a town of Westphalia, capital of a territory of the same name. Near this town prince Ferdinand of Brunswick defeated the French in 1759. It is subject to the king of Prussia, and is seated on the Weser; 27 miles E. by S. of Osnaburg, and 37 W. of Hanover. Lon. 9. 5 E. Lat. 52. 22 N.

MI'NDFUL. *a.* (*mind* and *full.*) Attentive; heedful; having memory (*Hammond*).

MI'NDFULLY. *ad.* Attentively; heedfully.

MI'NDFULNESS. *s.* Attention; regard.

MI'NDLESS. *a.* (from *mind.*) 1. Inattentive; regardless (*Prior*). 2. Not endued with a mind; having no intellectual powers (*Davies*). 3. Stupid; unthinking (*Shakspeare*).

MIND-STRICKEN. *a.* (*mind* and *stricken*). Moved; affected in his mind (*Sidney*).

MINDORO, one of the Philippine Islands, 50 miles in circumference, separated from Luconia by a narrow channel. It is full of mountains, which abound in palm-trees, and all sorts of fruit. The inhabitants are pagans, and pay tribute to the Spaniards.

MINE, in natural history, a deep pit under ground, from whence various kinds of minerals are dug out; but the term is more particularly applied to those which yield metals. Where stones only are procured, the appellation of quarries is universally bestowed upon the places from which they are dug out, however deep they may be.

As, therefore, the matter dug out of mines is various, the mines themselves acquire various denominations, as gold-mines, silver-mines, copper-mines, iron-mines, diamond-mines, salt-mines, mines of antimony, of alum, &c.

Mines, then, in general, are veins or cavities within the earth, whose sides receding from, or approaching nearer to each other, make them of unequal breadths in different places, sometimes forming larger spaces, which are called holes: they are filled with substances, which, whether metallic or of any other nature, are called the loads; when the substances forming these loads are reducible to metal, the loads are by the miners said to be alive; otherwise they are called dead loads. In Cornwall and Devon, the loads always hold their course from eastward to westward; though in other parts of England, they frequently run from north to south. The miners report, that the sides of the load never bear in a perpendicular, but constantly underlay, either to the north or to the south. The load is frequently intercepted by the crossing of a vein of earth, or stone, or some different metallic substance; in which case it generally happens that part of the load is moved a considerable distance to the one side. This transient load is by the miners called flooking: and that part of the load which is to be moved is said to be heaved. According to Dr. Nichols's observations upon mines, they seem to be, or to have been, the channels through which the water pass within the earth, and, like rivers, have their small branches opening into them, in all directions. Most mines have streams of water running through them; and when they are found dry, it seems to be owing to the waters having changed their course, as being obliged to it, either because the load has stopped up the ancient passages, or that some new and more easy ones are made. Mines, says Dr. Shaw, are liable to many contingencies; being sometimes poor, sometimes soon exhaustible, sometimes subject to be drowned, especially

when deep, and sometimes hard to trace; yet there are many instances of mines proving highly advantageous for hundreds of years: the mines of Potosi are to this day worked with nearly the same success as at first; the gold-mines of Cremnitz have been worked for thousands of years; and our Cornish tin-mines are extremely ancient. The neat profit of the silver alone, dug in the Misnian silver-mines in Saxony, is still, in the space of eight years, computed at a thousand six hundred and forty-four millions, besides seventy-three tons of gold. Many mines have been discovered by accident: a torrent first laid open a rich vein of the silver-mine at Friberg in Germany; sometimes a violent wind, by blowing up trees, or overturning the parts of rocks, has discovered a mine; the same has happened by violent showers, earthquakes, thunder, the firing of woods, or even the stroke of a plough-share, or horse's hoof.

But the art of mining does not wait for these favourable accidents, but directly goes upon the search and discovery of such mineral veins, ores, or sands, as may be worth the working for metal. The principal investigation and discovery of mines depend upon a particular sagacity, or acquired habit of judging from particular signs, that metallic matters are contained in certain parts of the earth, not far below its surface. The principal signs of a latent metallic vein, seems reducible to general heads, such as, 1. The discovery of certain mineral waters. 2. The discoloration of the trees or grass of a place. 3. The finding of pieces of ore on the surface of the ground. 4. The rise of warm exhalations. 5. The finding of metallic sands, and the like. All which are so many encouragements for making a stricter search near the places where any thing of this kind appears; whence rules of practice might be formed for reducing this art to a greater certainty. But when no evident mark of a mine appears, the skilful mineralist usually bores into the earth, in such places as from some analogy of knowledge, gained by experience, or by observing the situation, course, or nature of other mines, he judges may contain metal.

After the mine is found, the next thing to be considered is whether it may be dug to advantage. In order to determine this, we are duly to weigh the nature of the place, and its situation, as to wood, water, carriage, healthiness, and the like, and compare the result with the richness of the ore, the charge of digging, stamping, washing, and smelting.

Particularly the form and situation of the spot should be well considered. A mine must either happen, 1. In a mountain. 2. In a hill. 3. In a valley. Or, 4. in a flat. But mountains and hills are dug with much greater ease and convenience, chiefly because the drains and burrows, that is, the adits or avenues, may be here readily cut, both to drain the water and to form gangways for bringing out the lead, &c. In all the four cases we are to look out for the veins which the rains, or other accidental thing, may have laid bare; and if such a vein be found, it may often be proper to open the mine at that place, especially if the vein prove tolerably large and rich: otherwise the most commodious place for situation is to be chosen for the purpose, viz. neither on a flat, nor on the tops of mountains, but on the sides. The best situation for a mine is a mountainous, woody, wholesome spot; of a safe easy ascent, and bordering on a navigable river. The places abounding with mines are generally healthy, as standing high, and every where exposed to the air; yet some places, where mines are found, prove poisonous, and can upon no account be dug, though ever so rich: the way of examining a suspected place of this kind, is to make experiments upon brutes, by exposing them to the effluvia or exhalations to find the effect. (*British Ency.*)

MINE, in military affairs, is also a subterraneous cavity made according to the rules of art, in which a certain quantity of powder is lodged, which by its explosion blows up the earth above it.

It has been found by experiment that the figure produced by the explosion is a paraboloid; and that the centre of the powder, or charge, occupies the focus.

The place where the powder is lodged is called the chamber of the mine, or forneau.

The passage leading to the powder is called the gallery.

The line drawn from the centre of the chamber, perpendicular to the nearest surface of the ground, is called the line of least resistance.

The pit or hole, made by springing the mine, is called the excavation.

The fire is communicated to the mine by a pipe or hose, made of coarse cloth, whose diameter is about one inch and a half, called a saucisson (for the filling of which near half a pound of powder is allowed to every foot), extending from the chamber to the entrance of the gallery; to the end of which is fixed a match, that the miner who sets fire to it may have time to retire before it reaches the chamber.

To prevent the powder from contracting any dampness, the saucisson is laid in a small trough, called an auget, made of boards, three inches and a half broad, joined together lengthwise, with straw in it, and round the saucisson, with a wooden cover nailed upon it.

Galleries and chambers of mines.—Galleries made within the fortification, before the place is attacked, and from which several branches are carried to different places, are generally four feet or four and a half wide, and five feet or five and a half high. The earth is supported from falling in by arches and walls, if they are to remain for a considerable time; but when mines are made to be used in a short time, then the galleries are but three feet or three and a half wide, and five feet high, and the earth is supported by wooden frames or props.

The gallery being carried on to the place where the powder is to be lodged, the miners make the chamber. This is generally of a cubical form, large enough to hold the wooden box, which contains the powder necessary for the

charge: the box is lined with straw and sand-bags, to prevent the powder from contracting dampness.

The chamber is sunk something lower than the gallery, if the soil permits; but where water is to be apprehended, it must be made higher than the gallery; otherwise the besieged will let in the water, and spoil the mine.

Quantities of powder to charge mines.—Before any calculation can be made of the proper charge for a mine, the density and tenacity of the soil in which it is to be made must be ascertained, either by experiment, or otherwise; for in soils of the same density, that which has the greatest tenacity will require the greatest force to separate its parts. The density is determined by weighing a cubic foot (or any certain quantity) of the soil; but the tenacity can only be determined by making a mine. The following table contains experiments in six different soils, which may be of some assistance to form a judgment of the nature of the soil, when an actual experiment cannot be had:

Nature of the soil.	Density. Weight of one cubic foot.	Tenacity. Quantity of powder to raise one cubic fathom.
1. Loose earth or sand	95 pds.	8 pds.
2. Common light soil	124	10
3. Loam, or strong soil	127	12¼
4. Potter's clay, or stiff soil	135	13½
5. Clay, mixed with stones	160	16
6. Masonry	205	21½

Loading and stopping of mines.—The gallery and chamber being ready to be loaded, a strong box of wood is made of the size and figure of the chamber, being about one-third or one-fourth bigger than is required for containing the necessary quantity of powder: against the sides and bottom of the box is put some straw; and this straw is covered over with empty sand-bags, to prevent the powder from contracting any dampness: a hole is made in the side next the gallery, near the bottom, for the saucisson to pass through; which is fixed to the middle of the bottom, by means of a wooden peg, to prevent its loosening from the powder; or that, if the enemy should get to the entrance, he may not be able to tear it out. This done, the powder is brought in sand-bags, and thrown loose in the box, and covered also with straw and sand-bags; upon this is put the cover of the box, pressed down very tight with strong props; and, to render them more secure, planks are also put above them, against the earth, and wedged in as fast as possible.

This done, the vacant spaces between the props are filled up with stones and dung, and rammed in the strongest manner: the least neglect in this work will considerably alter the effect of the mine.

The auget is then laid from the chamber to the entrance of the gallery, with some straw at the bottom; and the saucisson laid in it, with straw over it: lastly, it must be shut with a wooden cover nailed upon it. Great care must be taken, in stopping up the gallery, not to press too hard upon the auget, for fear of spoiling the saucisson; which may hinder the powder from taking fire, and so prevent the mine from springing. The gallery is stopped up with stones, earth, and dung, well rammed, six or seven feet further from the chamber than the length of the line of least resistance.

MINE. *pronoun possessive.* (myn, Saxon.) Belonging to me (*Dryden*).

To MINE. *v. n.* (from the noun.) To dig mines or burrows (*Woodward*).

To MINE. *v. a.* To sap; to ruin by mines; to destroy by slow degrees (*Shakspeare*).

MINEHEAD, a borough in Somersetshire, with a market on Wednesday. It has a good harbour on the Bristol channel, for ships of large burden; and carries on a trade in wool, coal, and herrings. It sends two members to parliament, and is 31 miles N. of Exeter, and 161 W. by S. of London. Lon. 3. 34 W. Lat. 51. 12 N.

MINEIDES, the daughters of Minyas or Mineus, king of Orchomenos, in Bœotia. They were three in number, Leuconoe, Leucippe, and Alcithoe. Ovid calls the two first Clymene and Iris. They derided the orgies of Bacchus, for which impiety the god inspired them with an unconquerable desire of eating human flesh. They drew lots which of them should give up her son as food to the rest. The lot fell upon Leucippe, and she gave up her son Hippasus, who was instantly devoured by the three sisters. They were changed into bats.

MINER. *s.* (*mineur*, French.) 1. One who digs for metals (*Dryden*). 2. One who makes military mines (*Tatler*).

MINERAL, in natural history, is used in general for all fossile bodies, whether simple or compound, dug out of a mine; from whence it takes its denomination.

MINERAL CAOUTCHOUC: a species of BITUMEN, which see.

MINERAL MUMMY. Mineral pitch. A species of BITUMEN, which see.

MINERAL TALLOW: a species of BITUMEN, which see.

MINERAL TAR: a species of BITUMEN, which see.

MINERAL WATERS, (*Aquæ minerales. Aquæ medicinales.*) Waters holding minerals in solution. But as all water, in a natural state, is impregnated, either more or less, with some mineral substances, the name mineral waters should be confined to such waters as are sufficiently impregnated with mineral matters to produce some sensible effects on the animal economy, and either to cure or prevent some of the diseases to which the human body is liable. On this account, these waters might be with much more propriety called medicinal waters,

were not the name by which they are commonly known too firmly established by long use.

The first knowledge of mineral waters, like every other branch of knowledge we possess, was accidentally discovered. The good effects they produced on such as used them, have doubtless been the cause of distinguishing them from common waters. The first philosophers who considered their properties attended only to their sensible qualities, such as colour, weight, or lightness, smell, and taste. Pliny, however, distinguished a great number of waters, either by their physical properties or their uses; but the inquiry after methods of ascertaining, by chymical processes, the quantity and quality of the principles held in solution by mineral waters, was not attempted till the seventeenth century. Boyle is one of the first who, in the valuable experiments on colours published by him at Oxford in 1663, mentioned several re-agents capable of indicating the substances dissolved in water, by the alteration produced in their colours. The academy of sciences, from its first institution, was aware of the importance of analysing mineral waters; and Duclos, in 1667, attempted the examination of the mineral waters of France: the researches of this chemist may be found in the original memoirs of this society. Boyle was particularly employed in enquiries respecting mineral waters about the end of the seventeenth century, and published a treatise on this subject in 1685. Boulduc, in the year 1729, published a method of analysing waters, which is much more perfect than any which were employed before his time: it consists in evaporating these fluids at different times, and separating by filtration the substances which are deposited, in proportion as the evaporation proceeds.

Many celebrated chemists have since made successful experiments on mineral waters, and almost every one made valuable discoveries respecting the different principles contained in these fluids. Boulduc discovered natron, and determined its properties: Le Roi, physician of Montpellier, discovered calcareous; muriat Margraaff, the muriat of magnesia; Priestley, carbonic acid; and Monnet and Bergman the sulphurated or hepatic hydrogen gass. The two last mentioned chemists, besides the discoveries with which they have enriched the art of analysing waters, have published complete treatises on the method of proceeding in this analysis; and have carried this part of chemistry to a degree of perfection and accuracy far exceeding that which it possessed before the time of their labours. We are likewise in possession of particular analyses, made by very good chemists, of a great number of mineral waters, and which serve to throw great light on this inquiry, which, with justice, is esteemed one of the most difficult in the whole art of chemistry. The limits here prescribed do not permit us to enter at large into the history of the analysis of waters, which may be found in many treatises, one of the best of which is that published a few years since by Dr. Saunders.

Principles contained in Mineral Waters.—It is but a few years since the substances capable of remaining in solution in water have been accurately known. This appears to have arisen from the want of accurate chemical methods of ascertaining the nature of these substances: and the certainty of their existence has naturally followed the discovery of methods of ascertaining them. Another cause which has retarded the progress of science in this respect is, that mineral matters dissolved in waters are almost always in very small doses, and are also mixed together in considerable numbers, so that they mutually tend to conceal or alter those properties in which their distinctive characters consist. Nevertheless, the numerous experiments of the chemists before quoted, and a great number of others, which we shall occasionally mention, have shown, that some mineral substances are often found in waters, others scarcely ever met with; and lastly, many which are never held in solution by that fluid. We shall here consider each class of these substances in order.

Siliceous earth is sometimes suspended in waters; and as it is in a state of extreme division, it remains suspended without precipitating; but its quantity is extremely minute. The carbonated alkalis and chalk probably contribute to render siliceous earth soluble.

Alumine likewise appears to exist in water. The extreme subtlety of this earth, by which it is dispersed through the whole mass of water, causes it to render them turbid. Argillaceous waters are therefore whitish, and have a pearl or opal colour; they are likewise smooth, or greasy to the touch, and have been called saponaceous waters. Carbonic acid seems favourable to the suspension and solution of alumine in water.

Lime, magnesia, and barytes, are never found pure in waters; they are always combined with acids.

Fixed alkalis are never met with in a state of purity in waters. but frequently combined with acids, in the form of neutral salts.

The same observation applies to ammoniac, and most acids, except the carbonic acid, which is often free, and in possession of all its properties in waters. It constitutes a peculiar class of mineral waters, known by the name of gaseous, spirituous, or acidulous waters.

Among the neutral salts, with bases of fixed alkalis, scarcely any are met with but sulphat of soda or Glauber's salt, the muriats of soda and of potash, and carbonat of soda, which are frequently dissolved in mineral waters; nitrat and carbonat of potash are rarely found.

Sulphat of lime, calcareous muriat, chalk, sulphat of magnesia, or Epsom salt, muriat of magnesia, and carbonat of magnesia, are the earthy salts which are most commonly found in waters. As to the calcareous nitrat of magnesia, which some chemists have asserted they have met with, these salts are scarcely ever found in mineral waters properly so called, though they exist in salt waters.

The aluminous neutral salts, and salts with base of barytes, are scarcely ever dissolved in waters. Alum or acid sulphat of alumine appears to exist in some waters.

Pure hydrogen gass has not yet been found dissolved in mineral waters.

Pure sulphur has not yet been found in these fluids, though it exists very rarely in small quantities in the state of sulphuret of soda. Sulphureous waters are most commonly mineralized by sulphurated hydrogen gass.

Lastly, Among metals, iron is most commonly dissolved in water, and may be found in two states; either combined with carbonic acid, or with the sulphuric acid. Some chemists have supposed that it was likewise dissolved in its metallic state, without an acid intermedium: but as this metal scarcely ever exists in nature without being in the state of oxyd, combined with the carbonic or sulphuric acid, the opinion of these philosophers could only be maintained at the time when the carbonic acid was not yet discovered: and the solution of iron in water, without the assistance of the sulphuric

acid, could not otherwise be accounted for. Bergman affirms, that iron, as well as manganese, is found in certain waters, combined with the muriatic acid.

Oxyd of arsenic, and the sulphats of copper and zinc, which exist in many waters, communicate poisonous properties to them, and show, when discovered by analysis, that the use of such waters must be carefully avoided.

Most chemists at present deny the existence of bitumen in waters: in fact, the bitter taste was the cause why waters were formerly supposed to contain this oily substance; but it is now known that this taste, which does not exist in bitumen, is produced by the calcareous muriat.

There is no difficulty in conceiving how water, which percolates through the interior parts of the globe, and especially through the mountains, may become charged with the different substances we have enumerated. It is likewise clear, that according to the nature and extent of the strata of earth, through which they pass, mineral waters will be more or less charged with these principles, and that the quantity and nature of these principles must be subject to great variations, especially when we consider the changes in the direction of their course to which these fluids are liable from the various alterations which the globe undergoes, particularly on its surface and its more elevated parts.

Classes of Mineral Waters.—It appears from what we have already observed respecting the different substances usually contained in mineral waters, that these fluids may be classed according to the earthy, saline, and metallic substances they hold in solution; and that the number of classes, on this principle, would be very considerable: but it must be observed, that none of these substances are found single and alone in waters; but, on the contrary, they are often dissolved in the number of three, four, five, or even more. This circumstance creates a difficulty in the methodical classification of waters, relative to the principles that they contain. However, if we attend to those substances which are the most abundantly contained in waters, or whose properties are the most prevalent, we shall be able to make a distinction, which, though not very accurate, will be sufficient to arrange these fluids, and to form a judgment of their virtues. Chemists who have attended to mineral waters in general have availed themselves of this method. Monnet has established three classes of mineral waters; the alkaline, the sulphureous, and the ferruginous; and subsequent discoveries have enlarged the number of classes. Duchanoy, who has published a valuable treatise on the art of imitating mineral waters, distinguishes ten, viz. the gaseous, the alkaline, the earthy, the ferruginous, the simple hot, the gaseous thermal, the saponaceous, the sulphureous, the bituminous, and the saline waters. Although it may be urged as a reproach, that this author has made his classes too numerous, since the pure gaseous and bituminous waters are unknown; yet his division is doubtless the most complete, and gives the most accurate idea of the nature of the different mineral waters, and consequently is the best suited to his subject. We shall here propose a division less extensive, and in our opinion more methodical, than that of Duchanoy; at the same time observing, that we do not consider simple thermal waters as mineral waters, because they consist merely of heated water, according to the best chemists; and that we shall not speak of bituminous waters, because none such have been yet found.

It appears to us, that all mineral waters may be arranged in four classes, viz. acidulous, saline, sulphureous, and ferruginous waters.

CLASS I.—*Acidulous Waters.*

Gaseous waters, which may with more propriety be called acidulous waters, are those in which the carbonic acid predominates; they are known by their sharpe taste, and the facility with which they boil and afford bubbles by simple agitation: they redden the tincture of turnsole, precipitate lime water and alkaline sulphures. As no waters have yet been discovered which contain this acid pure and alone, we think this class may be divided into several orders, according to the other principles contained in them, or the modifications they exhibit. They all appear to contain more or less alkali and calcareous earth; but their different degrees of heat afford a good criterion for dividing them into two orders: the first might comprehend cold, acidulous, and alkaline waters, such as those of Seltzer, Saint-Myon, Bard, Langeac, Chateldon, Vals, &c. in the second might be placed hot, or thermal, acidulous, and alkaline waters, as those of Mount D'Or, Vichy, Chatelguyon, &c.

CLASS II.—*Saline or Salt Waters.*

By the name of saline waters, we understand such as contain a sufficient quantity of neutral salt to act strongly on the animal economy, so as most commonly to purge. The theory and nature of these waters are easily discovered; they perfectly resemble the solutions of salt made in our laboratories; but they almost always contain two or three different species of salts. The sulphat of soda is very rare; sulphat of magnesia, or Epsom salt, marine salt, or muriat of soda, calcareous and magnesian muriats, or the saline principles which mineralize them, either together or separate. The waters of Sedliz, of Seydschutz, and of Egra, abound with Epsom salt, frequently mixed with muriat of magnesia. Those of Balaruc contain muriat of soda, chalk, and the calcareous and magnesian muriats; those of Bourbonne, muriat of soda, sulphat of lime and chalk; and those of la Mothe contain muriat of soda, sulphat of lime, chalk, sulphat of magnesia, muriat of magnesia, and an extractive matter. It must be here observed, that salts, with base of magnesia, are much more common in waters than has hitherto been supposed; and that few analyses have yet been made in which they have been well distinguished from calcareous muriat.

CLASS III.—*Sulphureous Waters.*

The name of sulphureous waters has been given to such mineral waters as appear to possess some of the properties of sulphur; such as the smell, and the property of discolouring silver. Chemists have long been ignorant of the true mineralizer of these waters; most have supposed it to be sulphur, but they never succeeded in exhibiting it, or at least have found it in quantities scarcely perceptible. Those who have made experiments on some of these waters have allowed them to contain either sulphureous spirit, or an alkaline sulphur. Venel and Monnet are the first who opposed this opinion; the latter, in particular, nearly discovered the truth, when he considered sulphureous waters as impregnated merely by the vapour of

liver of sulphur. Rouelle the younger likewise affirmed, that these fluids might be imitated by agitating water in contact with air, disengaged from an alkaline sulphure by an acid. Bergman carried this doctrine much farther; by examining the properties of sulphurated hydrogen gass, he has proved that this gass mineralizes sulphureous waters, which he therefore calls hepatic waters, and has directed methods of ascertaining the presence of sulphur. Notwithstanding these discoveries, Duchanoy, speaking of sulphureous waters, admits of sulphur, sometimes alkaline, sometimes calcareous, or aluminous. He follows the opinion of Le Roy of Montpellier, who proposed a sulphure with base of magnesia in imitating these waters. It appears in fact to be true, that there are waters which contain a small quantity of sulphur, while there are others which are mineralized only by sulphurated hydrogen gass. In this case it will be necessary to distinguish sulphureous waters into two orders: 1. Those which contain a small quantity of alkaline or calcareous sulphur; and, 2. Those which are only impregnated with sulphuric hydrogen gass. The waters of Bareges and Cauterets, and the Bonnes waters, appear to belong to this first order; and those of St. Amant, Aix la Chapelle, and Montmorency, appear to belong to the second. Most of these waters are thermal, but that of Montmorency is cold.

CLASS IV.—*Ferruginous Waters.*

Iron being the most abundant of metals, and the most susceptible of alteration, it is not to be wondered at that water easily becomes charged with it, and consequently that the ferruginous waters are the most abundant and most common of all mineral waters. Modern chemistry has thrown great light on this class of waters; they were formerly supposed to be all impregnated with sulphat of iron. Monnet has ascertained that most of them do not contain this salt, and he supposed that the iron is dissolved without the intermedium of an acid. It is at present known, that the iron is not in the state of sulphat, but is dissolved by means of the carbonic acid, and forms the salt which we have called the carbonat of iron. Lane, Rouelle, Bergman, and many other chemists, have put this out of doubt. The greater or less quantity of carbonic acid, and the state of the iron in waters of this kind, render it necessary to distinguish the present class into three orders.

The first order comprehends martial acidulous waters, in which the iron is held in solution by the carbonic acid, whose superabundance renders them brisk and subacid. The waters of Bussang, Spa, Pyrmont, Pouhon, and La Dominique de Vals, are of this first order.

The second contains simple martial waters in which the iron is dissolved by the carbonic acid, without excess of the latter. These waters consequently are not acidulous. The water of Forges, Aumale, and Conde, as well as the greater number of ferruginous waters, are of this order; this distinction of ferruginous waters was made by Duchanoy.

But we add a third order, after Monnet, which is that of waters containing sulphat of iron. Though these are extremely rare, yet some of them are found. Monnet has placed the waters of Passy in this order. Opoix admits the sulphat of iron, even in a considerable quantity, in the waters of Provins. It is true, that De Fourcy denies its existence, and considers the iron of these waters as dissolved by carbonic acid. But no decision can be made respecting this subject, because the results of these chemists entirely disagree, and require new experiments to be made. It must be added, that the iron is not found alone in these waters, but is mixed with chalk, sulphat of lime, various muriatic salts, &c. However, as the metal they contain is the principal basis of their properties, they must be called ferruginous, in conformity with the principles we have laid down.

As to the saponaceous waters admitted by Duchanoy, we must wait till chemical and medical experiments have ascertained the cause of their saponaceous property, which this physician attributes to alumine; as well as of the effects they may produce in the animal economy, as medicines, by virtue of this property.

From these details we find, that all mineral and medicinal waters are divided into nine orders, viz.

Cold acidulous waters.
Hot or thermal acidulous waters.
Sulphuric saline waters.
Muriatic saline waters.
Simple sulphureous waters.
Sulphurated gaseous waters.
Simple ferruginous waters.
Ferruginous and acidulous waters.
Sulphuric ferruginous waters.

Examination of Mineral Waters, according to their Physical Properties.—After having shown the different matters which may be found in waters, and exhibited a slight sketch of the method in which they may be divided into classes and orders, according to their principles, it will be necessary to mention the methods of analysing them, and discovering with the greatest possible degree of accuracy the substances they hold in solution. This analysis has been justly considered as the most difficult part of chemistry, since it requires a perfect knowledge of all chemical phenomena, joined to the habit of making experiments. To obtain an accurate knowledge of the nature of any water proposed to be examined, 1. The situation of the spring, and the nature of the soil, more especially with respect to mineral strata, must be carefully observed; for this purpose, cavities may be dug to different depths, in order to discover, by inspection, the substances with which the water may be charged. 2. The physical properties of the water itself, such as its taste, smell, colour, transparence, weight, and temperature, must next be examined; for this purpose, two thermometers, which perfectly agree, and a good hydrometer, must be provided. These preliminary experiments require likewise to be made in the different seasons, different times of the day, and especially in different states of the atmosphere; for a continuance of dry weather, or of abundant rain, has a singular influence on waters. These first trials usually show the class to which the water under examination may be referred, and direct the method of analysis. 3. The depositions formed at the bottom of the basons, the substances which float on the water, and the matters which rise by sublimation, form likewise an object of important research, which must not be neglected. After this preliminary examination, the proper analysis may be proceeded on, which is made after three methods, by re-agents, by distillation, and by evaporation.

Examination of Mineral Waters, by Re-agents.—Those substances, which are mixed with waters, in order to discover the nature of the bodies held

in solution by such waters, from the phænomena they present, are called re-agents.

The best chemists have always considered the use of re-agents as a very uncertain method of discovering the principles of mineral waters. This opinion is founded on the considerations that their effects do not determine in an accurate manner the nature of the substances held in solutions in waters; that the cause of the changes which happen in fluids by their addition is often unknown; and that in fact the saline matters usually applied in this analysis are capable of producing a great number of phænomena, respecting which it is often difficult to form any decision. For these reasons, most chemists who have undertaken this analysis have placed little dependence on the application of re-agents. They have concluded, that evaporation affords a much surer method of ascertaining the nature and quantity of the principles of mineral waters: and it is taken for granted, in the best works on the analysis of these fluids, that re-agents are only to be used as secondary means, which at most serve to indicate or afford a probable guess of the nature of the principles contained in waters; and for this reason, modern analysts have admitted no more than a certain number of re-agents, and have greatly diminished the list of those used by the earlier chemists.

But it cannot be doubted at present, that the heat required to evaporate the water, however gentle it may be, must produce sensible alterations in its principles, and change them in such a manner, as that their residues, examined by the different methods of chemistry, shall afford compounds differing from those which were originally held in solution in the water. The loss of the gaseous substances, which frequently are the principal agents in mineral waters, singularly changes their nature, and besides causing a precipitation of many substances, which owe their solubility to the presence of these volatile matters, likewise produces a re-action among the other fixed matters, whose properties are accordingly changed. The phænomena of double decompositions, which heat is capable of producing between compounds that remain unchanged in cold water, cannot be estimated and allowed for, but in consequence of a long series of experiments not yet made. Without entering, therefore, more fully into these considerations, it will be enough to observe, that this assertion, whose truth is admitted by every chemist, sufficiently shows that evaporation is not entirely to be depended on. Hence it becomes a question, whether there be any method of ascertaining the peculiar nature of substances dissolved in water without having recourse to heat; and whether the accurate results of the numerous experiments of modern writers afford any process for correcting the error which might arise from evaporation. The following pages, extracted from a memoir communicated by M. Fourcroy to the Royal Society of Medicine, will shew, that very pure re-agents used in a peculiar manner may be of much greater use in the analysis of mineral waters than has hitherto been thought.

Among the considerable number of re-agents proposed for the analysis of mineral waters, those which promise the most useful results are tincture of turnsole, syrup of violets, lime-water, pure and caustic potash, caustic ammoniac, concentrated sulphuric acid, nitrous acid, prussiat of lime, gallic alkohol, or spirituous tincture of nut-galls, the nitric solutions of mercury and of silver, paper coloured by the aqueous tincture of fernambouc, which becomes blue by means of alkalis, the aqueous tincture of terra merita, which the same salts convert to a brown red, the oxalic acid to exhibit the smallest quantity of lime, and the muriat of barytes to ascertain the smallest possible quantity of sulphuric acid.

The effects and use of these principal re-agents have been explained by all chemists, but they have not insisted on the necessity of their state of purity. Before they are employed it is of the utmost importance perfectly to ascertain their nature, in order to avoid fallacious effects. Bergman has treated very amply of the alterations they are capable of producing. This celebrated chemist affirms, that paper coloured with the tincture of turnsole becomes of a deeper blue by alkalis; but that it is not altered by the carbonic acid. But as this colouring matter is useful chiefly to ascertain the presence of this acid, he directs its tincture in water to be used, sufficiently diluted, till it has a blue colour. He absolutely rejects syrup of violets, because it is subject to ferment, and because it is scarcely ever obtained without adulteration in Sweden. Morveau adds in a note, that it is easy to distinguish a syrup coloured by turnsole, by the application of corrosive sublimate, which gives it a red colour, while it converts the true syrup of violets to a green.

Lime-water is one of the most useful agents in the analysis of mineral waters, though few chemists have expressly mentioned it in their works. This fluid decomposes metallic salts, especially sulphat of iron, whose metallic oxyd it precipitates; it separates alumine and magnesia from the sulphuric and muriatic acids, to which these substances are frequently united in waters. It likewise indicates the presence of carbonic acid, by its precipitation. M. Gioanetti, a physician of Turin, has very ingeniously applied it to ascertain the quantity of carbonic acid contained in the water of St. Vincent. This chemist, after having observed that the volume or bulk of this acid, from which its quantity has always been estimated, must vary, according to the temperature of the atmosphere, mixed nine parts of lime-water with two parts of the water of St. Vincent: he weighed the calcareous earth formed by the combination of the carbonic acid of the mineral water with lime, and found, according to the calculation of Jaquin, who proves the existence of thirteen ounces of this acid in thirty-two ounces of chalk, that the water of St. Vincent contained somewhat more than fifteen grains. But as the lime-water may seize the carbonic acid united with fixed alkali, as well as that which is at liberty, M. Gioanetti, to ascertain more exactly the quantity of this last, made the same experiment with water deprived of its disengaged acid by ebullition. This process may therefore be employed to determine, in an easy and accurate manner, the weight of disengaged carbonic acid, contained in a gaseous mineral water.

One of the principal reasons which have induced chemists to consider the action of re-agents in the analysis of mineral waters as very fallacious, is, that they are capable of indicating several different substances held in solution in waters, and that it is then very difficult to know exactly the effects they will produce. This observation relates more especially to potash, considered as a re-agent, because it decomposes all the salts which are formed by the union of acids with

alumine, magnesia, lime, and metals. When this alkali precipitates a mineral water, it cannot, therefore, be known by simple inspection of the precipitate of what nature the earthy salt decomposed in the experiment may be. Its effect is still more uncertain, when the alkali made use of is saturated with carbonic acid, as is most commonly the case, since the acid to which it is united augments the confusion of effects: for this reason, the use of very pure caustic potash is proposed, which likewise possesses an advantage over the effervescent alkali, viz. that of indicating the presence of chalk dissolved in a gaseous water, by virtue of the superabundant carbonic acid: for it seizes this acid, and the chalk falls down of course. This fact is established by pouring soap lees newly made into an artificial gaseous water, which holds chalk in solution. The latter substance is precipitated in proportion as the caustic fixed alkali seizes the carbonic acid which held it in solution. By evaporating the filtrated water to dryness, carbonat of soda is obtained, strongly effervescent with acids. The caustic fixed alkali likewise occasions a precipitate in mineral waters, though they do not contain earthy salts; for if they contain an alkaline neutral salt, of a less soluble nature, the additional alkali will precipitate it by uniting with the water, nearly in the same manner as alkohol does. M. Gioanetti has observed this phenomenon in the waters of St. Vincent; and it may easily be seen by pouring caustic alkali into a solution of sulphat of potash, or muriat of soda; these two salts being quickly precipitated.

Caustic ammoniac is in general less productive of error when mixed with mineral waters; because it decomposes only salts, with base of alumine or magnesia, and does not precipitate the calcareous salts. It is necessary, however, to make two observations respecting this salt: the first is, that it must be exceedingly caustic, or totally deprived of carbonic acid; without this precaution, it decomposes calcareous salts by double affinity: the second is, that the mixture must not be left exposed to air, when the effect of its action is required to be inspected several hours after it is added; because, as M. Gioanetti has well observed, this salt in a very short time seizes the carbonic acid of the atmosphere, and becomes capable of decomposing calcareous salts. To put this important fact out of doubt, Fourcroy made three decisive experiments; some grains of sulphat of lime, formed of transparent calcareous spar, because chalk, or Spanish white, contain magnesia and river water: he divided this solution into two parts; into the first he poured a few drops of very pure sulphuric acid, recently made, and very caustic; this he put into a well-closed bottle: at the end of twenty-four and forty-eight hours it was clear and transparent, without any precipitate, and therefore no decomposition had taken place. The second portion was treated in the same manner with ammoniac, but placed in a vessel which communicated with the air by a large aperture: at the end of a few hours a cloud was formed near the upper surface, which continually increased, and was at last precipitated to the bottom. This deposition effervesced strongly with sulphuric acid, and formed sulphat of lime. The carbonic acid contained in this precipitate was therefore afforded by the ammoniac which had attracted it from the atmosphere. This combination of carbonic acid and ammoniac forms ammoniacal carbonat, capable of decomposing calcareous salts by double affinity, as Black, Jacquin, and many other chemists have shown, and as may be easily proved by pouring a solution of ammoniacal carbonat into a solution of sulphat of lime, which is not rendered turbid by caustic ammoniac. Lastly, to render the theory of this second experiment clearer, Fourcroy took the first portion to which the caustic ammoniac had been added, and which, having been kept in a close vessel, had lost no part of its transparency. He reversed the bottle which contained it, over the funnel of a very small pneumato-chemical apparatus, and by the assistance of a syphon, passed into it carbonic acid gass, disengaged from the effervescent fixed alkali by sulphuric acid. In proportion as the bubbles of this acid passed through the mixture, it became turbid in the same manner as lime-water; by filtration a precipitate was separated, which was found to be chalk, and the water, by evaporation, afforded ammoniacal sulphat: gaseous water, or the liquid carbonic acid, produced the same composition in another mixture of sulphat of lime, and caustic ammoniac. This decisive experiment clearly shows, that ammoniac decomposes sulphat of lime by double affinity, and by means of the carbonic acid. Hence we see, that when it is required to preserve a mixture of the mineral water with ammoniac for several hours (which is sometimes necessary, because it does not decompose certain earthy salts, but very slowly), the experiment must be made in a vessel which can be accurately closed, in order to prevent the contact of air, which would falsify the result. This precaution, which is of great importance in the use of all re-agents, is likewise mentioned by Bergman and Gioanetti. To these may be added another observation concerning the use of ammoniac. As it is a matter of considerable difficulty to preserve ammoniac in the state of perfect causticity, though it is necessary to be had in such a state, for the analysis of mineral waters, a very simple expedient, which may be applied in this case. It is to pour a small quantity of ammoniac into a retort, whose neck is plunged in the mineral water: when the retort is slightly heated, the ammonical gass becomes disengaged, and passes highly caustic into the water. If it occasions a precipitate, it may be concluded that the mineral water contains sulphat of iron, which may be known by the colour of the precipitate, or otherwise that it contains salts, with base of aluminous or magnesian earth. Generally this precipitate is formed by the chalk which was held in solution in the water, by means of the carbonic acid; ammoniac absorbs this acid, and the chalk is deposited. It is difficult to determine from the physical properties of the earthy precipitate formed in waters by caustic ammoniac, to which of the two last bases it is to be attributed; yet the manner in which it is formed may serve to decide. Six grains of sulphat of magnesia were dissolved in four ounces of distilled water, and six grains of alum in an equal quantity of the same fluid: through each of these solutions a small quantity of ammoniacal gass was passed: the first solution immediately became turbid, while the latter did not begin to exhibit a precipitate till twenty minutes after. These mixtures were carefully included in well-closed bottles. The same phenomenon took place with the nitrats and muriats of magnesia and alumine, dissolved in equal quantities of distilled water, and treated in the same manner. The quickness or slowness of the precipitation of a mineral water, by the addition

of ammoniacal gass, therefore affords the means of ascertaining the nature of the earthy salt decomposed by this gass. In general, salts, with base of magnesia, are much more usually met with than those with base of aluminous earth. Bergman has observed, that ammoniac is capable of forming with sulphat of magnesia a compound, in which a portion of this neutral salt is combined, without decomposition, with a portion of ammoniacal sulphat. This non-decomposed portion of sulphat of magnesia may probably form, with the ammoniacal sulphat, a mixed neutral salt, similar to the ammoniaco-mercurial muriat, or sal alembroth. The ammoniac does not, therefore, precipitate the whole of the magnesia, and consequently does not accurately exhibit the quantity of Epsom salt, of which that earth is the base. For this reason lime water is preferable for ascertaining the nature and quantity of salts with base of magnesia contained in mineral waters. It has likewise the property of precipitating the salts with aluminous base much more abundantly and readily than ammoniacal gass.

The concentrated sulphuric acid precipitates a white powder from water which contains barytes, according to Bergman; but, as the same chemist observes, that this earth is seldom found in mineral waters, it will not be necessary to enlarge on the effects of this re-agent. When it produces an effervescence, or bubbles in water, it indicates the presence of chalk, carbonat of soda, or pure carbonic acid; each of these substances may be distinguished by certain peculiar phenomena. If water containing chalk be heated after the addition of sulphuric acid, a pellicle and deposition of sulphat of lime are soon formed, which does not happen with waters which are simply alkaline. At first consideration it may seem that the sulphat of lime ought to be precipitated as soon as the sulphuric acid is poured into water containing chalk; this, however, very seldom happens without the assistance of heat, because these waters most commonly contain a superabundance of carbonic acid, which favours the solution of the sulphat of lime, and of which it is necessary to deprive them before the salt can be precipitated. This fact may be shown in the clearest manner, by pouring a few drops of concentrated sulphuric acid into a certain quantity of lime water which has been precipitated, and afterwards rendered clear by the addition of carbonic acid: if the lime water be highly charged with regenerated calcareous earth, a precipitate of sulphat of lime is thrown down in a few minutes, or more slowly in proportion as the carbonic acid is set at liberty. If no precipitate be afforded by standing, as will be the case when the quantity of sulphat of lime is very small, and the superabundant carbonic acid considerable, the application of a slight degree of heat will cause a pellicle of calcareous sulphat, and a precipitate of the same nature to be formed.

The nitrous acid is recommended by Bergman to precipitate sulphur from hepatized waters. The experiment may be made by pouring a few drops of the brown and fuming acid on distilled water, in which the gas disengaged from caustic alkaline sulphure, heated in a retort, has been received. This artificial hepatic water, which does not considerably differ from natural sulphureous waters, except in the circumstance of its being more difficult to filter, and its always appearing somewhat turbid, affords a precipitate in a few seconds, by the addition of nitrous acid; the precipitate is of a yellowish white; when collected on a filter and dried, it burns with the flame and smell of sulphur, and in other respects has every character of that inflammable body. Nitrous acid seems to alter sulphurated hydrogen gass in the same manner as it does all other inflammable substances, by virtue of the great quantity of oxygen it contains. Scheele has recommended the oxygenated muriatic acid to precipitate the sulphur from waters of this nature: only a very small quantity of it must be used, otherwise the sulphur will be burned and reduced to the state of sulphuric acid. Sulphureous acid precipitates the sulphur very readily from waters which contain it.

There are few re-agents whose mode of action is less known than that of the alkaline lixivium of blood, which has been called phlogisticated alkali; it has been long since ascertained, that this liquor contains Prussian blue, or prussiat of iron, ready formed; it has been thought that this blue might be separated by the addition of an acid; and in this state it has been proposed as a substance capable of exhibiting iron existing in mineral waters. Nothing can be more uncertain than the complete separation of prussiat of iron from this prussiat of potash made of blood. This lixivium ought therefore to be no longer used as a re-agent. Macquer having discovered that Prussian blue is decomposed by alkalis, proposed potash saturated with the colouring matter of this blue, as a test to ascertain the presence of iron in mineral waters. But as the liquor itself likewise contains a small quantity of Prussian blue, which may be separated by means of an acid, as Macquer has shown, Baumé advises that two or three ounces of distilled vinegar be added to each pound of this Prussian alkali, and digested in a gentle heat, till the whole of the Prussian blue is precipitated; after which pure fixed alkali is to be added to saturate the acid of vinegar. Notwithstanding this ingenious process, Fourcroy has observed, that the Prussian alkali, purified by vinegar, deposits Prussian blue in process of time, more especially by evaporation. M. Gioanetti made the same observation by evaporating the Prussian alkali, purified, by the method of Baumé, to dryness: he has proposed two processes for obtaining this liquor in a state of purity, and totally exempt from iron; the one consists in supersaturating the Prussian alkali with distilled vinegar, evaporating it to dryness by a gentle heat, dissolving the remaining mass in distilled water, and filtrating the solution; all the Prussian blue remains on the filter, and the liquor which passes through contains none at all. The other process consists in neutralizing the alkali with a solution of alum, from which after filtrating the sulphat of potash is separated by evaporation. These two liquors do not afford a particle of Prussian blue with the pure acids, nor by evaporation to dryness. The lime water, saturated with the colouring matter of Prussian blue, mentioned by us in treating on iron, does not require these preliminary operations: when poured on a solution of sulphat of iron, it immediately forms pure Prussian blue, without any mixture of green. Acids only precipitate a few particles of Prussian blue from this re-agent; it therefore does not contain iron, and consequently is preferable to the Prussian alkalis, in the assay of mineral waters. This phenomenon doubtless depends on the action of the lime, which, when dissolved in water, is far from having the same efficacy on iron as alkalis have. This prussiat of lime seems to be exceedingly well adapted to distinguish ferruginous waters, whe-

ther they be gaseous or sulphuric. In fact the carbonic gass, which holds iron in solution in waters, being of an acid nature, decomposes Prussian lixiviums by the way of double affinity, as well as sulphat of iron. Fourcroy tried prussiat of lime on Spa waters, and those of Passy, and he immediately obtained a very perceptible blue in the former, and very abundant in the latter. This, therefore, is a liquor very easily prepared, which does not contain the smallest portion of Prussian blue, and is exceedingly well calculated to exhibit the presence of small quantities of iron in waters. It is a kind of neutral salt, formed by the prussic acid, or the colouring part of the blue and lime.

Nut-galls, as well as all other bitter and astringent vegetables, such as oak bark, the fruit of the cypress tree, the husks of nuts, &c. have the property of precipitating solutions of iron, and exhibiting that metal of different colours, according to its quantity, its state, and that of the water in which it is dissolved. This colour in general is of all shades, from a pale rose to the deepest black. It is well known that the purple colour assumed by waters, with the tincture of nut-galls, is not a proof that they contain iron in its metallic state, since the sulphat and carbonat of iron likewise assumes a purple colour by the infusion of nut-galls. The differences of colour observed in these precipitations depend rather on the quantity of iron, its greater or less degree of adhesion to the water, and the more or less advanced state of decomposition of the solution, relatively to the quantity of oxygen contained in the iron. The astringent principle is known to be a peculiar acid, since it unites with alkalis, converts blue vegetable colours to a red, decomposes alkaline sulphures, and combines with metallic oxyds. Nut-galls in powder, the infusion of this substance in water, made without heat, and the tincture by alkohol, are used to ascertain the presence of iron in mineral waters. The tincture is preferred, because it is not subject to become mouldy as the aqueous solution is. The distilled products of nut-galls likewise colour ferruginous solutions. The infusions in acids, alkalis, oils, and ether exhibit the same phenomenon. The iron precipitated by this matter from acids is in the state of gallat of iron, and forms a kind of neutral salt, which though very black, is not attracted by the magnet. It dissolves slowly, and without sensible effervescence in acids, but loses these properties by the action of fire, and is then attracted by the magnet. The nut-gall is so efficacious a re-agent, that a single drop of its tincture colours, in the space of five minutes, with a purple tinge, three pints of water, which contains only the twenty-fifth part of a grain of sulphat of iron. All these phenomena proceed from the great facility with which the matter of nut-galls burns, and from its readily absorbing from the iron a portion of the oxygen it contains, passing by this means to the state of a black oxyd, or Ethiops, the smallest quantity of which is very perceptible in transparent liquors.

The two last re-agents we shall propose for the examination of waters, are solutions of silver and of mercury in the nitric acid. These have usually been employed to exhibit the presence of the sulphuric or muriatic acids in mineral waters; but many other substances, which do not contain the smallest portion of those, are likewise precipitated by these solutions. The white and heavy striæ which the nitrat of silver exhibits in water, that contains no more than half a grain of muriat of soda in the pint, ascertains the presence of the muriatic acid with great certainty and facility; but they do not in the same manner indicate the presence of the sulphuric acid, since, according to Bergman's estimate, at least thirty grains of sulphat of soda must exist in the pint of water, in order to produce an immediate sensible effect. To this we may add, that fixed alkali, chalk, and magnesia, precipitate the nitric solution of silver in a much more evident manner, and consequently that the precipitation formed in a mineral water by this solution is insufficient to determine with precision the saline or earthy substances from which it arose.

The solution of mercury by the nitric acid is still more productive of error: it not only indicates the presence of the sulphuric and muriatic acids in waters, but it is likewise precipitated by the earthy and alkaline carbonats, in a yellowish powder, which might be mistaken for an effect of the sulphuric acid. It has been commonly supposed, that the very abundant white precipitate which it forms in water is owing to the presence of a muriatic salt; yet mucilaginous and extractive substances exhibit the same phenomenon, as is now well known to all chemists. Besides these sources of error and uncertainty, dependent on the property which several substances have, of producing similar precipitates with the nitric solution of mercury, there are likewise others which depend on the state of this solution itself, and which it is of the utmost consequence to know, in order to avoid very considerable errors in the analysis of waters. Bergman has mentioned some of the remarkable differences observed in this solution, according to the manner in which it is made, either with or without heat, more particularly with respect to the colour of the precipitates it affords by different intermediums; but he does not say a word concerning the property this solution possesses of being precipitated by distilled water, when it is highly charged with the oxyd of mercury; though Monnet mentions this fact in his treatise on the dissolution of metals. As this subject is of great importance in the analysis of waters, Fourcroy endeavoured by a very minute investigation to arrive at some degree of certainty concerning it, and has succeeded, as shall presently appear, by very simple means. He has made a great number of solutions of mercury, in very pure nitric acid, with different doses of these two substances, with heat and in the cold, and with acids of very different strengths. These experiments have afforded the following results.

1. Solutions made in the cold became charged more or less readily with different quantities of mercury, according to the degree of concentration of the nitric acid; but whatever the quantity of mercury dissolved in the cold by the concentrated acid may be, no part of it will be precipitated by mere water. He dissolved in the cold two drachms and a half of mercury, in two drachms of nitrous acid red and fuming, weighing one ounce four drachms and five grains, in a bottle which contained an ounce of distilled water: the combination took place with the utmost rapidity; very dense nitrous gass escaped, together with aqueous vapours, dissipated by the heat of the mixture, amounting to more than one fourth of the acid. This solution was of a deep green, and very transparent: he poured a few drops into half an ounce of distilled water: some white striæ were formed, which were dissolved by agitation, and afforded no

precipitate, though it was the most saturated solution he could make in the cold, and presented the greatest degree of commotion, effervescence, and red vapours, during the combination of the mercury and acids. As it had deposited crystals, he added two drachms of distilled water, which dissolved the whole without any appearance of precipitation. With much greater safety, therefore, may such solutions as have been made in the cold with common nitric acid, and half their weight of mercury, be used in the analysis of mineral waters, for they will never afford a precipitate by the addition of mere water.

2. The weakest nitric acid strongly heated on mercury will dissolve a larger quantity than the strongest acid in the cold. The solution, which is of a light yellow colour, will appear thick and oily, and will afford by standing an irregular yellowish mass, which may be changed into a beautiful turbith by the addition of boiling water; this solution poured into distilled water forms a very abundant precipitate of a yellow colour, similar to turbith. A solution made in the cold exhibits the same result, if it be strongly heated, so as to disengage a large quantity of nitrous gass. These solutions made with heat ought therefore to be excluded from the analysis of mineral waters, because they are decomposable by distilled water.

3. The two solutions appear to differ from each other in the quantity of oxyde of mercury, which is much greater in that which is precipitated by the water than in that which is not decomposable by that fluid. M. Fourcroy has proved this, by evaporating equal quantities of both these solutions in an apothecary's phial, to reduce them into red precipitate, and he obtained one fourth more of this precipitate from the solution which is decomposed by water than from that which is not rendered turbid. The specific gravity likewise appeared to me to be a good method of ascertaining the relative quantities of oxyd of mercury contained in these different fluids. He compared weights of equal masses of three mercurial nitrous solutions: the one, which was not at all precipitated by distilled water, and was the result of the first mentioned experiment, weighed one ounce, one drachm, and sixty-seven grains, in a bottle which contained exactly an ounce of distilled water. The second solution was made by a very gentle heat, and produced a slight opal colour with distilled water, and scarcely any sensible quantity of precipitate. The same bottle contained one ounce six drachms twenty-four grains. Lastly, a third mercurial solution considerably heated, and which precipitated a true turbith mineral of a dirty yellow, by distilled water, weighed in the same bottle one ounce seven drachms twenty five grains. A decisive experiment remained to be made to confirm this opinion still more perfectly. If the solution precipitated by water owed this property to a quantity of mercurial oxyd too large with respect to the acid, it would of course lose that property by the addition of acid; this accordingly happened. Aquafortis was poured on a solution which was decomposed by water, and it soon acquired the property of no longer being precipitated, and was absolutely in the same state as that which had been made slowly at first, by the mere heat of the atmosphere. Monnet has mentioned this process, as a means of preventing crystals or mercurial nitrat from becoming converted into oxyd by the contact of the air. It is by a contrary process, and by evaporating a portion of the acid of a good solution, which is not precipitated by water, that it is converted into a solution much more strongly charged with mercurial oxyd, and consequently capable of being decomposed by water; its original property may be restored by the addition of a quantity of acid, equal to that which it lost by evaporation.

Such are the different considerations M. Fourcroy has thought necessary to exhibit, that the effects of re-agents on waters may be better ascertained: but whatever may be the degree of precision to which researches of this nature may be carried; however extensive the knowledge we may have acquried concerning the degrees of purity, and the different states of such substances as are combined with mineral waters, for the purpose of discovering their principles; if it still remains a fact, that each of these re-agents is capable of indicating two or three different substances dissolved in these waters, the result of their action will always be subject to uncertainty. Lime, for example, seizes the carbonic acid, and precipitates salts with the base of alumine, and of magnesia, as well as the metallic salts. Ammoniac produces the same effect. Fixed alkalis, besides the above-mentioned salts, precipitate those with base of lime. The calcareous prussiat, the prussiat of potash, and gallic alkohol, precipitate the sulphat and carbonat of iron. The nitric solutions of silver and of mercury decompose all the sulphuric and muriatic salts, which may be various both in quantity and in kind, in the same water, and are themselves decomposable by alkalis, chalk, and magnesia. Among this great number of complicated effects, how shall we distinguish that which takes place in the water under examination, or by what means shall we ascertain whether it is simple or compounded?

These questions, though very difficult, for the time when the expedients of chemistry were little known, are nevertheless capable of being discussed in the present state of our knowledge. It must first be observed, that the nature of re-agents being much better known at present than it was some years ago, and their re-action on the principles of water better ascertained, it may, therefore, be strongly presumed that their application may be much more advantageously made than has hitherto been supposed; nevertheless, among the great number of excellent chemists who have attended to the analysis of waters, Messrs. Baumé, Bergman, and Gioanetti, are almost the only persons who have been aware of this great advantage. We have been long in the habit of examining mineral waters by re-agents, in very small doses, and often in glasses; the phenomena of the precipitations observed have been noted down, and the experiment carried no further. Baumé advises, in his chemistry, that a considerable quantity of the mineral water under examination should be saturated with fixed alkalis and with acids, that the precipitates be collected, and their nature examined. Bergman apprehended that the quantity of the principles contained in waters might be judged of from the weight of the precipitates obtained in these mixtures. Several other chemists have likewise employed this method, but always with a view to certain particular circumstances; and no one has hitherto proposed to make a connected analysis of mineral waters by this means. To succeed in this analysis, it would be proper to mix several pounds of the mineral water with each re-agent, till the latter ceases to produce any precipitate: the precipitate should then be suffered to subside during the

time of twenty-four hours, in a vessel accurately closed; after which the mixture being filtered, and the precipitate dried and weighed, the operator may proceed to examine it by the known methods. In this manner the nature of the substance will be clearly ascertained, on which the re-agent has acted, and the cause of the decomposition may consequently be inferred. A certain order may be followed in these operations, by mixing the waters first with such substances as stand least capable of altering them, and afterwards passing to other substances capable of producing changes more varied and difficult to explain. The following method is that which Fourcroy commonly uses in this kind of analysis. After having examined the taste, the colour, the weight, and all the other physical properties of a mineral water, he pours four pounds of lime water on an equal quantity of the fluid; if no precipitate is made in twenty-four hours, he is sure that the water contains neither disengaged carbonic acid nor alkaline carbonat, nor earthy salts with the base of aluminous earth or magnesia, nor metallic salts. But if a precipitate be formed, he filters the mixture, and examines the chemical properties of the deposited substance; if it has no taste, if it be insoluble in water, or effervesces with acids, or forms an insipid and almost insoluble salt by the addition of sulphuric acid, he concludes that it is chalk, and that the lime water has acted only on the carbonic acid dissolved in the water. If, on the contrary, it is small in quantity, and subsides very slowly; if it do not effervesce, and affords with the sulphuric acid a styptic salt, or a bitter and very soluble salt, it is formed by magnesia or aluminous earth, and often by both.

After the examination by lime water, Fourcroy pours on four other pounds of the same mineral water, a drachm or two of ammoniac perfectly caustic, or causes ammoniacal gass, disengaged by heat from the alkali, to pass into the water. When the water is saturated, it is left at rest in a close vessel for twenty-four hours; if a precipitate be afforded, it can only consist of ferruginous, or magnesian, or aluminous salts, whose nature is examined by the different methods mentioned in the foregoing paragraph. But the action of ammoniacal gass being more fallacious than that of lime water, which produces the same decompositions, it must be observed that this last should only be used as an assistant means, which does not afford results equally accurate with those produced by the former re-agent.

When salts with base of aluminous earth, or magnesia, have been discovered by lime water, or by ammoniacal gass, the caustic fixed alkalis may be used, to distinguish those with base of lime, such as sulphat and muriat of lime. For this purpose Fourcroy precipitates some pounds of the water, which is examined by either of these liquid alkalis, till it no longer produces any turbidness. As this alkali decomposes salts with base of aluminous earth, as well as those composed of lime; if the precipitate resembles in its form, colour, and quantity, that which lime water has afforded, it may be presumed that the water does not contain calcareous salt, and the chemical examinations of the precipitate usually confirms this suspicion: but if the mixture is much more turbid than that made with lime water; if the deposition be much heavier, more abundant, and more readily afforded, the lime is mixed with magnesia or alumine. This is ascertained by treating the precipitate after the different methods before explained. It may easily be concluded, that iron precipitated by re-agents, at the same time as the salino-terrestrial substances, is easily known by its colour and its taste; and that the small quantity of this metal separated in these processes, is not sufficient to affect the results.

It were useless to explain at large the effects of sulphuric acid, nitrous acid, gall-nuts, or of the calcareous and alkaline prussiats, employed as re-agents on mineral waters. The general account of these effects which has already been given may suffice; it need therefore only be noticed, that when they are mixed in large doses with these waters, and the precipitates collected, the nature and quantity of their principles may be more accurately ascertained, as has been done by Messrs. Bergman and Gioanetti. The products which the nitric solutions of silver or mercury afford when mixed with mineral waters deserve particular attention. It is more particularly necessary to operate with large quantities of water, when these re-agents are used, in order to determine the nature of the acids contained in the waters. The analysis of these fluids will be complete when their acids are known, because these are often combined with the bases exhibited by the re-agents before-mentioned. The colour, the form, and the abundance of the precipitates afforded by the nitric solutions of mercury and silver, have hitherto exhibited to chemists the nature of the acids which caused them. A thick and ponderous deposition immediately formed by these solutions, denotes the muriatic acid: if it is small in quantity, white, and crystallized with the nitrat of silver, or yellowish, and yellow and irregular when formed with that of mercury, and if it subside but slowly, it is attributed to the sulphuric acid. But as these two acids are often met with in the same water, and as alkali and chalk likewise decompose the solutions, the results or deductions made from the physical properties of the precipitates must be uncertain. It is therefore necessary to examine them more effectually: for this purpose, solutions of silver or of mercury may be mixed with five or six pounds of the water intended to be analysed. The mixtures being filtered, twenty-four hours after the precipitates must be dried, and treated according to the methods of chemistry. If the precipitate afforded by the nitric solution of mercury be heated in a retort, the portion of metal united with the muriatic acid of the waters will be volatilized into mercurius dulcis, and that which is combined with the sulphuric acid will remain at the bottom of the vessel, and exhibit a reddish colour. These two salts may likewise be distinguished by putting them on a hot coal; the sulphat of mercury, if present, emits a sulphureous acid, and assumes a red colour; the mercurial muriat remains white, and is volatilized without exhibiting any smell of sulphur. These phænomena likewise serve to distinguish the precipitates which may be formed by the alkaline substances contained in water, since the latter do not emit the sulphureous smell, and are not volatile without decomposition.

The precipitates produced by the combination of mineral waters with the nitric solution of silver may be as easily examined as the foregoing. Sulphat of silver being more soluble than the muriat of the same metal, distilled water may be successfully used to separate these salts. Muriat of silver is known by its fixity, its fusibility, and especially in its being less easily decomposed than sulphat of silver. This last, placed on hot coals, emits a sulphureous smell, and leaves an oxyd of silver, which may be fused without addition.

The Examination of the Mineral Waters by Distil-

lation.—Distillation is used in the analysis of waters, to ascertain the gaseous substances they may be united to. These substances are either air, more or less pure, or carbonic acid, or sulphurated hydrogen gass. To ascertain their nature and quantity, some pounds of the mineral water must be poured into a retort, sufficiently large to contain it, without being filled more than half or two-thirds of its capacity; to this vessel a recurved tube is to be adapted, which passes beneath an inverted vessel filled with mercury. In this disposition of the apparatus, the retort must be heated till the water perfectly boils, or till no more elastic fluid passes over. When the operation is finished, the quantity of air contained in the empty space of the retort must be subtracted from the bulk of the gass obtained; the rest consists of aeriform fluid, which was contained in the mineral water, whose properties may quickly be known by the proofs of a lighted taper, tincture of turnsole, and lime water; if it catches fire, and has a fœtid smell, it is sulphurated hydrogen gass; if it extinguishes the taper, reddens turnsole, and precipitates lime water, it is the carbonic acid; lastly, if it maintains combustion without taking fire, is without smell, and alters neither turnsole nor lime water, it is atmospheric air. It may happen that this fluid may be purer than the air of the atmosphere: in this case its degrees of purity may be judged by the manner in which it maintains combustion, or by mixing it with nitrous or hydrogen gass, in the eudiometers of Fontana and Volta. The process used in obtaining gaseous matters contained in waters is entirely modern. A moistened bladder was formerly used, which was adapted to the neck of a bottle filled with mineral water: the fluid was agitated, and by the swelling of the bladder, an estimate was made of the quantity of gass contained in the water. This method is now known to be fallacious, because water cannot give out all its gass but by ebullition, and because the sides of the moistened bladder alter and decompose the elastic fluid obtained. It is scarcely necessary to remark, that the phenomena exhibited by the water, during the escape of the gass, must be carefully examined, and that a less quantity of water may be exposed to distillation, in proportion as its taste and sparkling indicate that it contains a larger quantity of gass.

Such is the method recommended by modern chemists to obtain the elastic fluids combined with waters: it must be observed, 1. That this process cannot be depended on, with regard to acidulous waters, unless the pressure of the atmosphere, and the state of compression of the elastic fluid under the glass vessels, be more accurately accounted for: and as this is not easily done, the absorption of carbonic acid by lime water, proposed by Gioanetti, appears to be preferable. 2. Though it has been recommended by Bergman to obtain sulphurated hydrogen gass from sulphureous waters, it does not answer, because the heat of ebullition decomposes the gass, and it is likewise decomposed by the mercury, which is converted into ethiops, as soon as it comes in contact with this elastic fluid: for this reason, litharge should be used to absorb this gass in the cold, and to deprive sulphureous waters of their sulphur.

Examination of Mineral Waters by Evaporation.—Evaporation is generally considered as the most certain method of obtaining all the principles of mineral waters. We have before observed, and here repeat, that the experiments of Venel and Cornette show, that long continued ebullition may decompose saline matters dissolved in water, and for that reason we have advised the examination of them by re-agents, employed in greater proportions; yet evaporation may afford much information, when used, together with the analysis by re-agents, which ought always to be considered as one of the principal methods of examining waters.

The intention of evaporation being to collect the fixed principles contained in a mineral water, it is obvious, that in order to know the nature and proportion of these principles, a considerable quantity of the water must be evaporated, and so much the more, in proportion as the principles appear to exist in smaller quantities. When the water is thought to contain a large quantity of saline matter, about twenty pounds must be evaporated: if, on the contrary, it appears to hold but a very small quantity in solution, it will be necessary to evaporate a much larger quantity. It is sometimes requisite to perform this operation with several hundred pounds. The nature and form of the vessels in which waters are exposed for evaporation, is not a matter of indifference: those of metal, excepting silver, are altered by water; vessels of glass, of a certain magnitude, are very subject to be broken; but those of glazed smooth pottery are the most convenient, though the cracks in the glaze sometimes cause an absorption of saline matter; vessels of unglazed porcelain, called biscuit, would doubtless be the most convenient, but their price is a considerable obstacle. Chemists have proposed different methods of evaporating mineral waters; some have directed distillation to dryness, in close vessels, in order to prevent foreign substances, which float in the atmosphere, from mixing with the residue; but this method is excessively tedious: others have advised evaporation by a gentle heat, never carried to ebullition, because they supposed that this last heat alters the fixed principles, and carries a portion of them. This was the opinion of Venel and Bergman. Monnet, on the contrary, directs the water to be boiled, because this motion prevents the reception of foreign matters contained in the atmosphere. Bergman avoids this inconvenience, by directing the vessel to be covered, and a hole left in the middle of the cover for the vapours to pass out: this last method greatly retards the evaporation, because it diminishes the surface of the fluid. At the commencement, the heat used must be sufficient to repel the dust; but the greatest difference in the manipulation of this experiment consists in some writers directing that the substances deposited should be separated, as the evaporation proceeds, in order to obtain each pure and by itself; others, on the contrary, direct the operation to be carried on to dryness. We are of the opinion of Bergman, that this last method is the most expeditious and certain; because, notwithstanding the care which may be taken, in the first method, to separate the different substances which are deposited or crystallized, they are never obtained pure, and must always be examined by a subsequent analysis; and the method is besides inaccurate, on account of the frequent filtrations, and the loss it occasions. Lastly, it is very embarrassing, and renders the evaporation much longer. Mineral waters may therefore be evaporated to dryness, in open glass vessels, on the water-bath, or still more advantageously in glass retorts, on a sand-bath.

Various phænomena are observed during this operation; if the water be acidulous, it emits bubbles, as soon as the heat first begins to act; in proportion as the carbonic acid is disengaged, a pellicle is formed, with a deposition of calcareous earth, and carbonat of iron. These first pellicles are succeeded by the crystallization of sulphat of lime; and lastly, the muriats of potash and soda crystallize in tubes at the surface, but the deliquescent are not obtained but by evaporation to dryness.

The residue must then be weighed, and put into a small phial, with three or four times its weight of alkohol: the whole being agitated, and suffered to subside for some hours, must be filtrated, and the alkohol preserved separate. The residue on which the spirit has not acted must be dried in a gentle heat, or in the open air; when perfectly dry it must be weighed, and the loss of weight will show what quantity of calcareous or magnesian muriat was contained, because these salts are very soluble in alkohol. We shall presently speak of the method of ascertaining the presence of these two salts in the spirituous fluid.

The residue, after treatment with alkohol, and drying, must be agitated with eight times its weight of cold distilled water, and filtered. After some hours standing, the residue is to be dried a second time, and boiled half an hour in four or five hundred times its weight of distilled water; this last residue, after filtration, consists of that which cold or boiling water is insufficient to dissolve. The first water contains neutral salts, such as sulphat of soda, or of magnesia; the muriat of soda, or potash and the fixed alkalis, especially soda united with carbonic acid: the large quantity of boiling water scarcely contains any substance but sulphat of lime. There are therefore four substances to be examined, after these different operations on the matter obtained by evaporation. 1. The residue insoluble in alkohol, and in water of different temperatures. 2. The salts dissolved in alkohol. 3. The salts dissolved in cold water. 4, and lastly, Those dissolved in boiling water. We shall now proceed to the experiments necessary to ascertain the nature of these different substances.

1. The residue which has resisted the action of the alkohol and water may be composed of calcareous earth, of carbonat of magnesia and iron, of alumine, and of quartz. These two last substances are seldom found in waters, but the three first are very common; the brown, or more or less deep yellow colour, indicates the presence of iron. If the residue be of a white grey, it does not contain this metal. When iron is present, Bergman directs it to be moistened, and exposed to the air till it rusts; in which state vinegar does not act on it. In order to explain the methods of separating these different substances, we will suppose an insoluble residue to consist of the five substances here mentioned; it must first be moistened, and exposed to the rays of the sun; and when the iron is perfectly rusted, the residue must be digested in distilled vinegar. This acid dissolves the lime and magnesia, and by evaporation affords the calcareous acetit, distinguishable from the acetit of magnesia, by its not attracting the humidity of the air. They may consequently be separated by deliquescence, or by pouring sulphuric acid into their solution. The latter forms sulphat of lime, which precipitates; but if the magnesian acetit be present, the sulphat of magnesia, composed of magnesia united with the sulphuric acid, will remain in solution, and may be contained by a well conducted evaporation. To ascertain the quantity of magnesia and calcareous earths contained in this residue, sulphat of lime is first to be precipitated: and the sulphat of magnesia, formed by the sulphuric acid poured into the acetous solution, must then be precipitated by carbonat of potash. The quantities of these precipitates are known by weighing. When the chalk and magnesia of the residue are thus separated, the iron, the alumine, and the quartz remain. The iron and the alumine are dissolved by pure muriatic acid, from which the former is precipitated from prussiat of lime, and the latter by carbonat of potash. These precipitates must likewise be weighed. The matter which remains after the separation of the alumine and iron is usually quartorse; its quantity may be known by weighing, and its habitudes by fusion of the blow-pipe with carbonat of soda. Such are the most accurate processes, recommended by Bergman, for examining the insoluble residue of waters.

2. The alkohol used in washing the solid residue of mineral waters must be evaporated to dryness. Bergman advises treating it with sulphuric acid diluted with water, in the same manner as the acetous solution before spoken of; but it must be observed, that this process serves only to exhibit the bases of these salts. To determine the acid, which is ordinarily united with magnesia or lime, and sometimes with both, a few drops of concentrated sulphuric acid must be poured on, which excites an effervescence, and disengages the muriatic gass, known by its smell and white vapour, when the salt under examination contains that acid. This may likewise be known by dissolving the whole residue in water, and adding a few drops of the nitric solution of silver. The nature of the base, which, as we have observed, is either lime, magnesia, or both together, is known by the name of the sulphuric acid, by a similar process with that already explained respecting the acetous solution.

3. The water used in washing the first residue of the mineral water, performed as before directed, with eight times its weight of cold distilled water, contains neutral alkaline salts, such as sulphat of soda, muriats, or marine salts, carbonat of potash, and of soda, and sulphat of magnesia: a small quantity of sulphat of iron is sometimes found. These salts never exist altogether in waters: the sulphat of soda, and the carbonat of potash, are very seldom found; but marine salt is frequently met with, together with carbonat of soda. The sulphat of magnesia is likewise frequently met with, and some waters even contain it in considerable quantities. When the first washing of the residue of a mineral water contains only one kind of neutral salt, it may easily be obtained by crystallization, and its nature ascertained from its form, taste, and the action of fire, as well as that of the re-agents: but this case is very rare, for it is much more usual to find many salts united in this lixivium. They must therefore be separated, if practicable, by slow evaporation; but as this method does not always perfectly succeed, however carefully this evaporation be conducted, it will be necessary to re-examine the salts obtained at the different periods of the evaporation. Carbonat of soda is usually deposited confusedly with the muriatic salts, but they may be separated by a process, pointed out by M. Gioanetti.

It consists in washing this mixed salt with distilled vinegar; for this acid dissolves the carbonat of soda. The mixture must then be dried, and washed a second time with alkohol, which takes up the acetit of soda, without acting on marine salt. The spirituous solution being evaporated to dryness, and the residue calcined, the vinegar becomes decomposed and burns. Soda alone remains, whose quantity may be then accurately determined.

4. The water used in the quantity of four or five hundred times the weight of the residuum of the mineral water contains only sulphat of lime. This may be ascertained by pure caustic ammoniac, which ocasions no change, while caustic potash precipitates it abundantly. By evaporation to dryness, the quantity of earthy salt contained in the water may be accurately ascertained.

Artificial Mineral Waters.—The numerous processes we have prescribed for examining the residues of mineral waters by evaporation serve to ascertain, with the greatest precision, all the several matters held in solution in these fluids. Another process remains to be made to prove the success of the analysis, viz. That of imitating nature in the way of synthesis, by dissolving in pure water the different substances obtained by the analysis of mineral water which has been examined. If the artificial mineral water has the same taste, the same weight, and exhibits the same phænomena with re-agents as the natural mineral water, it is the most complete, and the most certain proof that the analysis has been well made. This artificial combination has likewise the advantage of being procured in all places at pleasure, and at a trifling expence; and is even in some cases superior to the natural mineral waters, for their whole properties may be changed by carriage, and other circumstances. The most celebrated chemists are of opinion, that it is possible to imitate mineral waters. Macquer has observed, that since the discovery of the carbonic acid, and the property it is found to possess of rendering many substances soluble in water, it is much more easy to prepare artificial mineral waters. Bergman has described the method of composing waters which perfectly imitate that of Spa, Sheltzer, Pyrmont, &c. He likewise informs us, that they are used with great success in Sweden, and that he himself has experienced their good effects. Duchanoy has published a work, in which he has given a number of processes for imitating all the mineral waters usually employed in medicine. We may therefore hope, that chemistry may render the most essential service to the art of healing, by affording valuable medicines, whose activity may be increased or diminished at pleasure.

In order to present the reader, under one point of view, with the most conspicuous features in the composition of the mineral waters of this and some other countries, the following synoptical table is subjoined, from Dr. Saunders' work on this subject.

The reader will please to observe, that under the head of *Neutral Purging Salts* are included the sulphats of soda and magnesia, and the muriats of lime, soda, and magnesia. The power which the earthy muriats may possess of acting on the intestinal canal is not quite ascertained, but from their great solubility, and from analogy with salts, with similar component parts, we may conclude that this forms a principal part of their operation.

The reader will likewise observe, that where the spaces are left blank, it signifies that we are ignorant whether any of the substance at the head of the column is contained in the water; that the word *none* implies a certainty of the absence of that substance; and the term *uncertain* means that the substance is contained, but that the quantity is not known.

For the several mineral waters, consult their respective heads, as MALVERN, MOFFAT, SPA WATERS, &c.

A SYNOPTICAL TABLE, *shewing the Composition of* MINERAL WATERS.

CLASS.	NAME.	Highest temperature. Fahrenheit.	Azotic gas. cubic inches	Carbonic acid, gas. cubic inches.	Sulphurated hydrogen. cubic inches.	Carbonated soda. grains.	Neutral purging salts. grains.	Selenite & earthy carbonates grains.	Oxyd of iron. grains.
			Contained in an English wine pint of 28.875 cubic inches.						
Simpler cold	Malvern			uncertain	none	none	uncertain	uncertain	none
	Holywell				none	none	uncertain	uncertain	none
Simpler thermal	Bristol	74°	uncertain	3.75	none	none	2.81	3.16	none
	Matlock	66°		uncertain	none	none	uncertain	uncertain	none
	Buxton	82°	0.474	uncertain	none	none	0.25	1.625	none
Simple saline	Sedlitz			1.	none	none	185.6	8.68	none
	Epsom				none	none	40.?	8.?	none
	Sea				none	none	237.5	6.	none
Highly carbonated alkaline	Seltzer			17.	none	4.	17.5	8.	none
Simple carbonated chalybeate . .	Tunbridge		0.675	1.325	none	none	0.344	0.156	0.125
Hot carbonated chalybeate . . .	Bath	116°	1.?	1.?	none	none	10.?	10.?	uncertain
Highly carbonated chalybeate .	Spa			12.79	none	1.47	4.639	1.47	0.56
	Pyrmont			26.	none	none	7.13	23.075	0.56
Saline, carbonated chalybeate .	Cheltenham		uncertain	5.087	uncertain	none	62.125	6.85	0.625
	Scarborough			uncertain	none	none	20.	10.	uncertain
Hot, saline, highly carbonated chalybeate	Vichy	120°?		uncertain	none	uncertain		uncertain	uncertain
	Carlsbad	165°		uncertain	none	11.76	47.04	4.15	uncertain
Vitriolated chalybeate	Hartfell				none	none	none	none	4.815*
Cold sulphureous	Harrogate		0.575	1.	2.375	none	91.25	3.	none
	Moffat		0.5	0.625	1.25	none	4.5	none	none
Hot, alkaline, sulphureous . .	Aix	143°		uncertain	uncertain	12.	5.	4.75	none
	Borset	132°		uncertain	uncertain	uncertain	uncertain		none
	Berege	120°			uncertain	2.5	0.5	uncertain	none

* That is, 2.94 contained in the sulphat of iron, (this salt when crystallized containing 28 per cent. of oxyd of iron, according to Kirwan) and 1.875 additional of oxyd of iron.

MINERALIST. *s.* (from *mineral.*) One skilled or employed in minerals (*Boyle*).

MINERALOGIST. *s.* (*mineralogie*, Fr.) One who discourses on minerals (*Brown*).

MINERALOGY. (from *minera*, Latin, a metallic vein; and λογος, Greek, a treatise or discourse.) The science of minerals or fossils. The term, however, is intrinsically barbarous, as being composed of two distinct languages, and might be advantageously exchanged for oryctology, but that it has obtained too extensive an introduction into almost all modern languages to be conveniently relinquished or altered.

So far as this science is connected with the arts of the jeweller and lapidary, it may be said to be nearly coeval with the world; for amongst the earliest historical records we meet with frequent references to the use of various metals and precious stones. The writings of Pliny, Theophrastus, and Dioscorides, unfold to us a very extensive degree of information concerning the knowledge of the Greeks and Romans in the same branch of natural history. But in none of these do we meet with any thing like a systematic arrangement; so that the first mineralogist who has any pretensions to a scientific study of fossile substances is George Agricola of Saxony: he first investigated their external characters, and judiciously defined and described them. His arrangement consists of two classes, first, simple or homogeneous minerals, subdivided into the four orders of terra, succus concretus, lapis and metallum; and second, heterogeneous minerals, subdivided into the orders of compound and mixt.

Cardan published his celebrated treatise very soon afterwards. He differs chiefly from Agricola in separating the saline from the inflammable bodies. Kentman's work De omni rerum Fossilium genere, Gemmis, Lapidibus, Metallis, &c. published in 1665, is nearly a transcript of Agricola, De Natura Fossilium. It contains, however, the addition of a treatise on petrifactions. Cæsalpinus, the botanist, and Bootius Von Boot, has already published their respective works on metals and precious stones, but they contain nothing of importance. The work, however, of a Mexican priest Alonzo Barba, written in Spanish about the same time, is entitled to a more minute notice as accurately describing the mode of working minerals, and as being the first treatise on amalgamation. This work is entitled De los Metallos. Aldrovandus followed shortly afterwards with his Museum Metallicum, a compilation extracted from Agricola, Cardan, and Cæsalpinus; and first drew the attention of mineralogists in any considerable degree to the subject of petrifactions. Aldrovandus was followed by Johnstone, in his Notitiæ Regni Mineralis, published in 1667, and by the celebrated jesuit Athanasius Kircher, in his Mundus Subterraneus, published in 1678. A few years afterwards Woodward published his Catalogue of Minerals, and may be regarded as the first English mineralogist of note.

In 1708, Becher published at Leyden his Physica Subterranea, in which he endeavoured to arrange minerals according to their constituent parts. He was the first writer who proposed the opinion that the difference in composition of earths and stones might be employed in their arrangement and discrimination; and first introduced the division of metals into perfect and imperfect. Bromel, who was a scholar of Becher's, improved upon this arrangement, and arranged sulphur and bituminous bodies in one common class. In the beginning and towards the middle of the same century, Beyer, Büttner, and Scheuchzer, employed themselves principally in the investigation of that highly interesting class of bodies petrifactions. And although their works are disfigured by many idle speculations, and the individual species are but indifferently ascertained, yet from this period the attention of mineralogists was more largely directed to an examination of vast masses of rocks, and other mountainous aggregations.

In 1730, Magnus Von Bromel, a scholar of Hiærne and Boerhaave, published his celebrated System of Minerals, which was divided into the following orders.

I. Earths.
II. Salts.
III. Sulphurs.
IV. Stones.
1. Resisting the action of fire.
2. Calcinable.
3. Vitrifying in fire.
4. Figured.
V. Petrifactions.
VI. Calculi.
VII. Semi-metals.
VIII. Metals.

This method, however, can hardly be called a system; for the inventor has omitted the classification, generic character, specific differences, and the synonyms of authors. He separates sand from earths; sulphurs from pyrites; refers serpentine to the marbles; and arranges mica with the calcareous earths.

In 1736 Linnéus published the first sketch of his mineral system; he republished it in an improved form in 1748, and added his finishing hand to it in 1768, when it stood as follows:

Class I. Rocks.

Order I. *Humosa.*
Gen. 1. Schist.

Order II. *Calcareous.*
Gen. 2. Marble.
3. Alabaster.
4. Stirium.
5. Spar.

Order III. *Argillaceous.*
Gen. 6. Talc.
7. Amiant.
8. Mica.

Order IV. *Arenate.*
Gen 9. Sandstone.
10. Quartz.
11. Silex.

Order V. *Aggregate.*
Gen. 12. Stone.

Class II. Minerals.

Order I. *Salts.*
Gen. 13. Nitre.
14. Natrum.
15. Borax.
16. Muria.
17. Alumen.
18. Vitriol.

Order II. *Sulphurs.*
Gen. 19. Ambergris.
20. Amber
21. Bitumen.
22. Pyrites.
23. Arsenic.

Order III. *Metals.*

Gen. 24. Quicksilver.
25. Molybdænum.
26. Antimony.
27. Zinc.
28. Bismuth.
29. Cobalt.
30. Tin.
31. Lead.
32. Iron.
33. Copper.
34. Silver.
35. Gold.

CLASS III. FOSSILS.

Order I. *Petrifactions.*

Gen. 36. Zoolite.
37. Ornitholite.
38. Amphibiolite.
39. Ichthyolite.
40. Entomolite.
41. Helminth© olite.
42. Phytolite.
43. Grapholite.

Order II. *Concrete.*

Gen. 44. Calculus.
45. Tartar.
46. Eagle-stone.
47. Pumice-stone.
48. Stalactite.
49. Toph.

Order III. *Earths.*

Gen. 50. Ochre.
51. Sand.
52. Clay.
53. Calx.
54. Soil.

This system is faulty in many respects; it has the merit however of having first drawn the attention of mineralogists to the study of the crystalline figures of minerals. Independently of which, although Linnéus cannot be said to have contributed much to the progress of mineralogy, yet indirectly his labours in the other branches of natural history laid the foundation of that reformation which was effected by subsequent mineralogists. He was the first who established right ideas of system, and showed that its principal object was to assist the memory, and to enable naturalists to distinguish bodies from one another, and thus to ascertain if the respective subjects of their investigation have been previously described by others. He also has the merit of having taught that no system can be of use that does not possess an uniformity in the basis of its classification and nomenclature, and a fixed and generally received language.

In the midst of the career of Linnéus, mineralogical chemistry was much advanced by the labours of Pott and Henckel; and especially of the former. Pott arranged earthy minerals according to their proportion of ingredients, and thus paved the way for many of the chemical systems of the present day. His four classes are the alkaline, siliceous, argillaceous and gypseous. An early death prevented this indefatigable chemist from extending his enquiries to the metals.

Waller, the contemporary of Linnéus, and professor of mineralogy at Upsal, published a system of much repute at Stockholm in 1747, and republished it with additions in 1772. The classes and orders were as follows:

I. EARTHS.
1. Dry.
2. Tenacious.
3. Mineralized.
4. Hard.

II. STONES.
1. Calcareous.
2. Vitrescent.
3. Fusible.
4. Apyrous.
5. Rocks.

III. MINERALS.
1. Salts.
2. Sulphurs.
3. Semi-metals.
4. Metals.

IV. CONCRETE.
1. Porous.
2. Petrifactive.
3. Figured.
4. Calculous.

In this system the external characters of the species were more accurately detailed than in any hitherto advanced; the terminology was improved, and the synonyms of preceding authors were elucidated. Waller was the first who subjected to a serious examination the principles on which mineralogists had hitherto arranged minerals. He rejected the characters drawn from use, value, and geological situation; and contended that classes, orders, and genera, should be arranged according to chemical, but species chiefly in conformity with the external characters.

In the interval between Waller's first and second edition of his system appeared those of Woltersdorf, a disciple of Pott; Cronstedt, Lehman, Vogel, Cartheuser and Just; none of which, however, excepting Cronstedt, which appeared in 1758, is entitled to a detailed notice. Cronstedt's system is built upon the following form:

I. EARTHS.
1. Calcareous.
2. Siliceous.
3. Granative.
4. Argillaceous.
5. Micaceous.
6. Fluors.
7. Asbestine.
8. Zeolithic.
9. Magnesiate.

II. SALTS.
1. Acids.
2. Alkalines.

III. PHLOGISTIC.

IV. METALS.
1. Perfect.
2. Imperfect.

This system is chiefly metallurgic; investigated upon chemical principles, peculiar and not compiled. It excludes many genera, as sand-stone, schist, soil, toph, stalactite, eagle-stone, calculus, nitre. Pumice-stone, rock, and petrifactions are added in an appendix. The author denies that crystals originate from salts, and considers their figures to be rather curious than useful. He doubts whether the colours of gems have their origin from metals; believes that calx existed before animals and vegetables; denies that the strata of the earth are regular; and considers characteristic definitions as useless.

MINERALOGY.

Our limits will not permit us to descant on the numerous systems that have since flowed in rapid succession. We shall only observe that the best of them are successively those of Veltheim, Bergman, Kirwan, Werner, Schmeisser, Babington, Gmelin, and Brogniast: and confine our remarks to the two which have been most extensively studied, namely, Werner's and Gmelin's.

Of these two we have selected the last, as offering the best text-book for the Pantologia: not, however, that we would recommend it in preference to the student who wishes to become deeply and extensively versed in mineralogy, but as being simpler and more comprehensible to the general reader. We shall begin therefore with this, though published a few years later in order of time, and shall close our article with a succinct epitome of the general scope and system of Werner, and of the improvements it has received from several illustrious scholars of this justly celebrated school.

The system of Gmelin is little more than an improvement upon that of Linnéus: it was published at Leipsic in 1793, and consists of the five following classes, instead of four, to which Linnéus had limited the subject.

CLASS I. EARTHS.

A. SIMPLE.

Order I. TALCOSE.

a. Greasy.

1. Talcum.

б. Dry and meager.

2. Serpentinus
3. Asbestus.
4. Actinotus.
5. Hornblenda.

Order II. PONDEROUS.

6. Barytes.
7. Crossopetra.
8. Strontia.
9. Sydneya.

Order III. CALCAREOUS.

a. Purer.

10. Creta.
11. Tophus.
12. Spathum.
13. Schistolithus.
14. Inolithus.
15. Stalactites.
16. Pisolithus.
17. Marmor.

б. Less pure.

†. Effervescing.

18. Suillus.
19. Tremolites.
20. Stellaris.
21. Humus.
22. Marga.
23. Magnesiata.

††. Not effervescing.

24. Gypsum.
25. Hepaticus.
26. Lazarus.
27. Fluor.
28. Apatites.
29. Boracites.

Order IV. ARGILLACEOUS.

30. Aluminaris.
31. Argilla.
32. Puteolana.
33. Cæmentum.
34. Cariosus.
35. Ardesia.
36. Basaltes.
37. Lava.
38. Mica.
39. Opalus.
40. Zeolithus.
41. Scorius.

Order V. SILICEOUS.

a. Fixed.

†. Impure.

42. Gemma.
43. Olivinus.
44. Felspatum.
45. Pyromachus.
46. Petrosilex.
47. Jaspis.
48. Smiris.
49. Circonius
50. Amarus.
51. Lydius.
52. Chlorogranatus.

††. Purer.

53. Arena.
54. Quartzum.
55. Chalcedonius.
56. Adamas.

Order VI. ADAMANTINE.

57. Adamantinus.

B. AGGREGATE.

a. With particles more or less crystalline, cohering by no visible intermediate cement.

58. Granites.
59. Gneissum.

б. With heterogeneous fragments immersed in masses of other stones.

60. Porphyrius.
61. Amygdalites.

γ. With fragments of stone conglutinated by a cement.

62. Breccia.
63. Arenarius.

CLASS II. SALTS.

64. Natrum.
65. Borax.
66. Muria.
67. Nitrum.
68. Mirabile.
69. Amarum.
70. Alumen.
71. Vitriolum.

CLASS III. INFLAMMABLES.

72. Turfa.
73. Bitumen.
74. Mellites.
75. Succinum.
76. Ambra.
77. Graphites.
78. Sulphur.

CLASS IV. METALS.

79. Uranium.
80. Wolframum.
81. Magnesium.
82. Stibium.
83. Zincum.
84. Molybdœna.
85. Stannum.
86. Cobaltum.

87. Ferrum.
88. Arsenicum.
89. Cuprum.
90. Niccolum.
91. Bismutum.
92. Argentum.
93. Plumbum.
94. Hydrargyrum.
95. Aurum.
96. Platina.

Appendix.

CLASS V. PETRIFACTIONS.

I. ANIMAL.

α. *Mammals.*
97. Anthropolithus.
98. Zoolithus.

β. *Birds.*
99. Ornitholithus.

γ. *Amphibials.*
100. Amphibiolithus.

δ. *Fishes.*
101. Ichthyolithus

ε. *Insects.*
102. Entomolithus.

ζ. *Worms.*
103. Conchyolithus.
104. Corallolithus.

II. VEGETABLE.
105. Phytolithus.

In enumerating the genera we have not added in the present table those of later discovery, because we have been desirous of giving it as published by the author himself. In the general course of our work, however, the reader will find that we have brought the science down to the present day, and have added the recently discovered metals of Osmium, Iridium, Rhodium, Palladium, Chromium, Columbium, Potassium, Sodium, &c. as well as the recent genera under the other classes.

The system of Werner is by far the most comprehensive of all the systems. It contemplates the science of mineralogy under the five following branches, oryctognosy, mineralogical chemistry, geognosy, mineralogical geography, and economical mineralogy.

Oryctognosy is that division of the subject which teaches us to know fossils, and to recognize them whenever they occur to us. It exhibits the different subjects arranged in an order corresponding as nearly as possible with that of their affinities, and distinguished from each other by appropriate denominations, and by determinate and defined characters. The object of mineralogical chemistry is the analysis of fossils, and the discovery of their constituent principles. *Geognosy* treats of the general structure of the earth. It makes us acquainted with the common and particular beds of fossils, with their probable origin, relative formation and arrangement in the earth: with the rocks which compose mountains, and which constitute, if not the solid mass, at least the great shell of the globe. The geognosy of this system is therefore, as we have already had occasion to observe, the geology of natural philosophers in general. (See the article GEOLOGY.) The province of *mineralogical geography* is to describe geographically the scite of fossils in different countries: and that of *economical mineralogy* the various economical purposes to which fossils may be applied.

It is to the first, second, and fourth of these branches of the general science as here laid down, that we confine our view of mineralogy upon the present occasion: the third having been already treated of under the article GEOLOGY, and the fifth entering into the detailed consideration of the individual articles as they occur in the course of the work.

The peculiar excellency of the Wernerian system is the accuracy and determinate power of the language which it has introduced: and in this respect the illustrious author has laudably as well as most successfully followed up the first efforts of Waller upon the same subject. In his classical work, Vonder Kennzeichen der Fossilier, he has admirably collected all the old and admitted characters, described others traced by himself on comparing minerals with minerals; defined the characters in common use, given to each an appropriate and fixed determination, and arranged the whole into a systematic order. The system of Werner is now therefore embraced with no small degree of enthusiasm over most parts of Europe, perhaps of the globe: Mr. Kirwan was one of the first who gave it publicity in our own country; M. Brochant, who has very considerably improved upon it, in France; and De la Rio in Spain: and now that it has enlisted into its service the very splendid and important discoveries of Roma de Lisle, and the Abbe Hauy, in the department of crystallography, it bids fair to triumph eventually over all the rest, and perhaps to continue as long as the science shall continue itself.

The following constitute its general principles and arrangement: the classes being four, viz. earths, salts, inflammables, and metals.

1. The earths, earthy fossils, or minerals compose the greater part of the crust of the earth, and generally form a covering to the rest. They are not remarkable for being brittle, heavy, or light-coloured: are little disposed to crystallize; are uninflammable in a low temperature; insipid; and without much smell.

2. The saline minerals are commonly heavyish, soft, and possess some degree of transparency.

3. The inflammables are light, brittle, mostly opake, of a yellow brown, or black colour, seldom crystallize, and never feel cold.

4. The metallic fossils are heavy, generally opake, tough, malleable, cold, not easily inflamed, and exhibit a great variety of colours of a peculiar lustre.

Under each of these classes are various genera, species, sub-species, and varieties, which we shall instance as we proceed. Sometimes, as in the vegetable kingdom, we find a strict affinity between different species of minerals; in which case they constitute or are said to belong to the same family. But in mineralogy one class does not always blend with another in a chemical point of view, nor furnish that beautiful gradation and almost imperceptible union which is to be traced in the other kingdoms of nature.

Antecedently, however, to a full developement of the classification in its different ramifications, it is necessary to give a brief explanation of the external characters by which minerals are distinguished under this system: for without this neither the individuals nor even the subdivisions themselves would be understood.

External Characters.

These are either generic or specific. The

generic characters consist in certain chemical properties of minerals, without any reference to such more palpable differences as colour, lustre, weight, &c.; while these palpable differences form the specific characters.

Generic characters may be general or particular. In the first division are comprehended those that occur in all minerals; in the last those that are found only in particular classes of minerals.

The particular generic external characters are thus advantageously arranged.

1. Colour.
2. Cohesion of particles; distinguished into solid, friable, and fluid.

In solid minerals are to be regarded the external shape, lustre, and surface. When broken, the lustre of the fracture, the fracture itself, and the shape of the fragments are to be noticed. In distinct concretions regard must be paid to the shape of the concretions, their surface, their lustre, transparency, streak and soiling. All these may be ascertained by the eye. By the touch we may discover the hardness of minerals, their tenacity, frangibility, flexibility, their unctuosity, coldness, weight, and adhesion to the tongue. By the ear we distinguish their sound, and by the smell and taste the qualities which these two senses indicate.

In friable minerals, external shape, lustre, aspect of particles, soiling, and degree of friability, are to be attended to.

In fluid minerals the lustre, transparency, and fluidity, are principal objects to be regarded.

The specific external characters of minerals are founded on the distinctions and varieties of the two great generic divisions. And first, of colours, the names of which are derived from certain bodies in which they most generally occur, either in a natural or artificial state, or from different mixtures and compositions of both.

I. Colour.

1. White. This may be snow-white, reddish-white, yellowish-white, silver-white, greyish-white, greenish-white, milk-white, or tin-white.

2. Grey. Lead-grey, bluish-grey, pearl-grey, reddish-grey, smoke-grey, greenish-grey, yellowish-grey, steel-grey, and ash-grey.

3. Black. Greyish-black, brownish-black, dark-black, iron-black, greenish-black, and bluish-black.

4. Blue. Indigo-blue, Prussian-blue, lavender-blue, smalt-blue, sky-blue.

5. Green. Verdegris-green, celaden-green, mountain-green, emerald-green, leek-green, apple-green, grass-green, pistachio-green, asparagus-green, olive-green, blackish-green, canary-green.

6. Yellow. Sulphur-yellow, lemon-yellow, gold-yellow, bell-metal yellow, straw-yellow, wine-yellow, Isabella-yellow, ochre-yellow, orange-yellow, honey-yellow, wax-yellow, brass-yellow.

7. Red. Morning-red, hyacinth-red, brick-red, scarlet-red, copper-red, blood-red, carmine-red, cochineal-red, crimson red, columbine-red, flesh-red, rose-red, peach-blossom-red, cherry-red, brownish-red.

8. Brown. Reddish-brown, clove-brown, hair-brown, yellowish-brown, tombac-brown, wood-brown, liver-brown, blackish-brown.

Besides these distinctions, colours may be clear, dark, light, or pale; they may have a tarnished appearance, a play, a changeablity, an iridescence, an opalescence, a permanent alteration, and a delineation of figure or pattern, such as dotted, spotted, clouded, flamed, striped, veined, dendritic, or ruiniform.

II. Cohesion of Particles.

Minerals are divided into, 1. Solid, or such as have their parts coherent, and not easily moveable; 2. Friable, or that state of aggregation in which the particles may be overcome by simple pressure of the finger; and 3. Fluid, or such as consist of particles which alter their place in regard to each other by their own weight.

1. *Solid Minerals.*

External aspect has three things to be regarded, 1. The shape; 2. The surface; and 3. The lustre. The external shape again may be common, particular, regular, or extraneous; and hence arise the specific differences.

1. The common external shape may be massive; disseminated coarsely, minutely, or finely; in angular pieces, sharp-cornered or blunt-cornered; in grains, large, coarse, small, fine, angular, flat, round; in plates, thick or thin; in membranes or flakes, thick, thin, or very thin.

The particular external shape may be longish, as dentiform, filiform, capillary, reticulatic, dendritic, coralliform, stalactitic, cylindrical, tubiform, claviform, or fruticose; roundish, as globular, spherical, ovoidal, spheroidal, amygdaloidal, botryoidal, reniform, tuberose, or fused-like; flat, as specular, or in leaves; cavernous, as cellular in various forms, with impressions, perforated, corroded, amorphous, or vesicular; entangled, as ramose, &c.

In the regular external shape or crystallization are to be regarded its genuineness, according to which it may be either true or supposititious; its shape, made up of planes, edges, angles, in which are to be observed the fundamental figure and its parts, the kind of fundamental figure, the varieties of each kind of fundamental figure, with their accidents and distinctions, and the alterations which the fundamental figure undergoes by truncation, by bevelment, by acumination, or by a division of the planes. There are a variety of figures under each of these subdivisions.

It must be remarked also, that the external shape may be extraneous, or derived from the animal and vegetable kingdoms, as in fossils and petrifications.

2. The external surface contains several varieties of distinctions. It may be uneven, granulated, rough, smooth, or streaked in various ways and directions.

3. The external lustre is the third generic external character, and is of much importance to be attended to. In this we have to consider the intensity of the lustre, whether it is splendent, shining, glistening, glimmering, or dull; next the sort of lustre, whether metallic or common. The latter is distinguished into semimetallic, adamantine, pearly, resinous, and vitreous.

Aspect of the Fracture of solid Minerals.

After the external aspect, the fracture forms no inconsiderable character in minerals. Its lustre may be determined as in the external lustre; but the fracture itself admits of great varieties. It may be compact, splintery, coarsely splintery, finely splintery, even, conchoidal, uneven, earthy, hackly. If the fracture is fibrous, we are to consider the thickness of the fibres, if coarse or delicate; the direction of the fibres, if straight or

curved; and the position of the fibres, if parallel or diverging.

In the radiated fracture we are to regard the breadth of the rays, their direction, their position, their passage or cleavage. In the foliated fracture, the size of the folia; their degree of perfection, their direction, position, aspect of their surface, passage or cleavage, and the number of cleavages, are to be noted.

The shape of the fragments may also be very various-regular, as cubic, rhomboidal, trapezoidal, &c. or irregular, as cuneiform, splintery, tabular, indeterminately angular.

Aspect of the distinct Concretions.

The shape of the distinct concretions forms very prominent external characters. They may be granular, different in shape, or in magnitude; they may be lamellar, distinct, concretious, differing in the direction of the lamellæ, in the thickness, with regard to shape, and in the position.

The surface of the distinct concretions may be smooth, rough, streaked, or uneven; as for their lustre, it may be determined in the same manner as the external lustre.

General Aspect as to Transparency.

Minerals, as is well known, have different degrees of transparency, which may be considered among their external characters. They may be transparent, semitransparent, translucent, translucent at the edges, or opaque.

The Streak.

The colour of this external character may be either similar or different. It is presented to us when a mineral is scraped with the point of a knife; and is similar when the powder that is formed is of the same colour with the mineral, as in chalk: or dissimilar or different, as in cinnabar, orpiment, &c.

The Soiling or Colouring

Is ascertained by taking any mineral substance between the fingers, or drawing it across some other body. It may soil strongly, as in chalk, slightly, as in molybdena, or not at all, which is a quality belonging to most of the solid minerals. All the preceding external characters are recognized by the eye.

External Characters from the Touch.

These are eight in number, and are not destitute of utility to the mineralogical student. 1. Hardness; 2. Tenacity; 3. Frangibility; 4. Flexibility; 5. Adhesion to the tongue; 6. Unctuosity; 7. Coldness; 8. Weight.

Hardness may be tried by a capacity to resist the file, yielding a little to it, by being semi-hard, soft, or very soft. Tenacity has different degrees, in substances being brittle, sectile or mild, or ductile. The frangibility consists in minerals being very difficultly frangible, difficultly frangible, easily frangible, or very easily frangible. The flexibility is proved by being simply flexible, elasticly flexible, commonly flexible, or inflexible. The adhesion to the tongue may be strongly adhesive, pretty strongly, weakly, very weakly, or not at all. Unctuosity may be meager, rather greasy, greasy, or very greasy. Coldness is subdivided into cold, pretty cold, rather cold. Weight may be distinguished into swimming or supernatant, light, rather light, heavy, very heavy. The three last divisions from the touch are in the Wernerian system regarded as anomalous; but they seem properly to be classed under this head.

External Characters from the Sound or Hearing.

The different kinds of sound which occur in the mineral kingdom are, 1. A ringing sound, as in native arsenic and thin splinters of horn-stone; 2. A grating sound, as in fresh-burnt clay; 3. A creaking sound, as that of natural amalgam.

2. *Friable Minerals.*

The external characters drawn from minerals of this class are derived, first, from the external shape, which may be massive, disseminated, thinly coating, spumous, or dendritic: secondly, from the lustre, regarded under its intensity, whether glimmering or dull, and its sort, whether common glimmering or metallic glimmering: thirdly, from the aspect of the particles, as being dusty or scaly: fourthly, from soiling or colouring, as strongly or lightly: and lastly, from the friability, which may be loose or cohering.

3. *Fluid Minerals.*

Of external characters drawn from fluid minerals there are only two kinds, which include three varieties: 1. The lustre, which is either metallic, as in mercury, or resinous, as in rock oil. 2. The transparency, which is transparent, as in naphtha; turbid, as in mineral oil; or opaque, as in mercury. 3. The fluidity, which may be fluid, as in mercury, or viscid, as in mountain tar.

External Characters from the Smell.

These may be spontaneously emitted and described, as bituminous, faintly sulphureous, or faintly bitter; or they may be produced by breathing on, and yield a clay-like smell; or they may be excited by friction, and smell urinous, sulphureous, garlick-like, or empyreumatic.

External Character from the Taste.

This character prevails chiefly in the saline class, and it contains the following varieties: a sweetish taste, sweetish astringent, styptic, saltly bitter, saltly cooling, alkaline, or urinous.

Having now given a synoptical view of the external characters of minerals, we shall proceed to their classification, and in this we shall chiefly follow the names and arrangement of professor Jameson.

CLASS I.

EARTHY FOSSILS.

First Genus. DIAMOND.

Diamond.

This precious stone has great variety of shades, exhibiting a beautiful play of colours. It occurs in indeterminately angular and completely spherical grains, which present planes of crystallization, or are actually crystallized. Its fundamental crystal is the octaedron, which passes into various forms. It is hard in the highest degree, brittle, not very difficultly frangible, and has a specific gravity of 3.600.

The diamond has, by modern experiments, been proved to be nearly pure carbon, and begins to burn at 14° or 15° of Wedgewood. See Plate 107. Mineralogy, figs. 1. and 2.

Second Genus. ZIRCON.

First Species. *Zircon.*

The prevailing colour is grey, but it occurs like-

wise green, blue, red, yellow, and brown, with various intermediate tints.

It is found most commonly in roundish angular pieces, with rounded angles and edges. When crystallized, the figure is generally a rectangular four-sided prism; somewhat flatly acuminated by four planes, set on lateral planes; but of this figure there are several varieties. The crystals are almost always very small, have a smooth surface, bordering on strongly splendent. Internally, the lustre is strongly splendent, passing into adamantine. Fig. 3.

Zircon is hard in a very high degree, brittle, frangible without great difficulty. Specific gravity 4.700. It forms a colourless transparent mass with borax, but is infusible by the blowpipe without addition.

Found in the island of Ceylon, where it was first discovered, and lately in Norway, imbedded in a rock composed of hornblend and felspar.

Frequently cut as a precious stone, and used as an inferior kind of diamond, of which it was once considered as a variety. Its play of colours very considerable.

Second Species. Hyacinth.

The chief colour is red, passing to reddish-brown, and to orange-yellow. The figure a rectangular four-sided prism, flatly acuminated by four planes, which are set in the lateral edges. Of this figure, however, several varieties occur.

The crystals are generally small, and always imbedded. The lateral planes smooth, and externally shining. Internally it is splendent and glassy, inclining somewhat to resinous.

The hyacinth is transparent, very hard, frangible without particular difficulty, feels a little greasy when cut, and has a specific gravity of about 4.000.

Is fusible with borax. Exposed to the blowpipe it loses its colour, but not its transparency.

Occurs in rocks of the newest floetz trap formation, and sometimes in sand. Is a native of Ceylon, the country of gems; of Spain, of Portugal, France, Italy, Saxony, and probably Scotland.

It takes a fine polish, and when the colours are good, it is highly valued. A third species, called cinnamon stone, has lately been discovered at Columbo, in Ceylon.

Third Genus. FLINT.

First Species. Chrysoberyl.

The prevailing or general colour is asparagus-green, passing into a variety of allied shades. It exhibits a milk-white light; occurs in roundish and angular grains, which sometimes approach in shape to the cube. It is seldom crystallized; but when in this state it commonly presents a longish six-sided table, having truncated lateral edges, and longitudinally streaked lateral planes. The crystals are small, externally shining, and internally splendent. Fig. 4.

It is hard, brittle, not very easily frangible, with a specific gravity of 3.600. Without addition it is infusible.

The chrysoberyl is found in Brazil, and in the sand of Ceylon. It is sometimes set in rings with a yellow foil, but is rarely in the possession of our jewellers.

Second Species. Chrysolite.

The chief colour is pistachio-green, of all degrees of intensity. It occurs in original angular sharp-edged pieces, with a rough, scaly, splintery surface, and when crystallized exhibits a broad rectangular four-sided prism, with its lateral edges sometimes truncated, sometimes bevilled, and acuminated by six planes. Fig. 5.

The external surface of the crystals is splendent, internally splendent, and vitreous.

Third Species. Olivine.

The colour is generally asparagus-green, of various degrees of intensity. It is found imbedded also in roundish pieces and grains; and when crystallized, which is rare, in rectangular four-sided prisms.

Internally, it is shining, varying between glistening and splendent. It is semitransparent, very easy frangible; in a low degree hard, and not particularly heavy. It is nearly infusible without addition. Occurs imbedded in basalt; is frequently found in Bohemia, and also in Hungary. Austria, France, England, Ireland, Scotland, Sweden, Iceland, and Norway. Pieces as large as a man's head have been found in some parts of Germany.

Fourth Species. Augite.

The general colour is blackish-green. It occurs chiefly in indeterminate angular pieces and roundish grains. Occasionally it is crystallized, and presents broad rectangular six-sided prisms. The crystals are mostly small. Internally the lustre is shining, approaching sometimes to splendent.

The augite is only translucent, and but faintly transparent. It is hard, not very easily frangible, and not particularly heavy.

It is found in basalt, either singly or accompanied with olivine, in Bohemia, Hungary; at Arthur's-seat, near Edinburgh; in some of the Hebrides, and in Norway. From olivine it is distinguished by its darker colours, the form of its crystallization, and its greater hardness.

Fifth Species. Vesuviane.

Its principal colour is dark olive-green, passing into other allied shades. It occurs massive, and often crystallized in rectangular four-sided prisms. The crystals are mostly short, and placed on one another. Externally their surface alternates between glistening and splendent. Internally they are glistening, with a lustre between vitreous and resinous.

The vesuviane is translucent, hard in a moderate degree, and approaching to heavy. Before the blow-pipe it melts without addition.

It is found among the exuviæ of Vesuvius, from whence it derives its name, in Siberia and Kamtschatka. At Naples, it is cut into ring-stones, and sold under various names.

Sixth Species. Leuzite.

The colours are yellowish and greyish-white. It occurs mostly in original round and angular grains. When crystallized, it exhibits acute double eight-sided pyramids. Internally it is shining, and approaching to glistening, with a vitreous lustre, inclining somewhat to resinous.

The leuzite is translucent and semitransparent. It is hard in a low degree, brittle, easily frangible, and not very heavy. It is infusible without addition. With borax, it forms a brownish transparent glass.

It is found in rocks of the newest floetz trap formation, particularly in basalt, near Naples, and in the vicinity of Rome. Bergman gave it the name of white garnet; but Werner has ascertained it to be a distinct species of itself.

Seventh Species. Melanite.

The general colour is velvet-black. It occurs crystallized in a six-sided prism. The crystals are middle-sized or small. Externally they are smooth and shining, approaching to splendent; internally shining, inclining to glistening.

The melanite is opaque, hard, pretty easily frangible, and not very heavy. It occurs imbedded in rocks of the newest floetz trap formation, and hitherto has been found only at Frescati and St. Albano, near Rome.

Eighth Species. Garnet.

This is divided into two sub-species, the precious garnet and the common garnet. See GARNET, and fig. 6.

Ninth Species. Pyrope.

The colour is dark blood-red. It occurs in small and middle-sized roundish and angular grains; but never crystallized. Its lustre is splendent and vitreous. It is completely transparent, hard so as to scratch quartz, and not particularly heavy.

The pyrope is found imbedded in serpentine in Saxony and Bohemia. In Fifeshire, Scotland, it is found in the sand on the sea shore. It is employed in various kinds of jewellery, and is generally set in a good foil.

Tenth Species. Grenatite.

The colour is a dark reddish-brown. It is always crystallized in broad six-sided prisms. The crystals are small and middle-sided, internally glistening, with a lustre between vitreous and resinous.

The grenatite varies from opaque to translucent, is hard, brittle, easily frangible, and not particularly heavy.

It is found imbedded in mica slate, in St. Gothard, Switzerland; and is also met with in Britanny and in Spain.

Eleventh Species. Spinelle.

The predominant colour is red, which passes on into blue, green, yellow, and brown. It occurs in grains, and likewise crystallized in octaedrons with several variations. The crystals are very rarely middle-sized. Externally and internally the lustre is splendent and vitreous.

The spinelle alternates from transparent to vitreous: it is hard in a pretty high degree, and approaches to heavy. It is fusible with borax: occurs in rocks belonging to the newest floetz trap formation; and is found in Pegu and Ceylon. It is used as a precious stone, and considerably valued, though possessing neither the hardness nor the fire of the oriental ruby.

Twelfth Species. Sapphire.

The principal colour Berlin blue; but it is found also red, with all the intermediate shades between these two colours. It occurs in small rolled pieces, and crystallized in double three-side pyramids, of which there are several varieties in figure.

The crystals are small and middle-sized. Internally the lustre is splendent and vitreous. It is more or less transparent in different specimens. Some varieties, when cut, exhibit a star of six rays. Fig. 7.

The sapphire is hard in the highest degree, but yields to the diamond; it is easily frangible, and rather heavy, having a specific gravity of about 4.000.

It is infusible without addition: occurs in rocks of the newest floetz trap formation, and is supposed to be an inmate of granite, syenite, and other primitive rocks.

This precious stone is found in the utmost beauty in Pegu and Ceylon. It is also a native of Portugal, of France, and of Bohemia. Next to the diamond, it is the most valuable of gems, and is used in the finest kind of jewellery.

It should be observed, that the violet-coloured sapphire is the oriental amethyst; that the yellow is the oriental chrysolite and topaz; and that the green is the oriental emerald.

Thirteenth Species. Corundum.

The principal colour is a greenish-white, of various degrees of intensity. It occurs massive, disseminated, in rolled pieces, and crystallized. The crystallizations resemble those of the sapphire, and the crystals are middle-sided and imbedded.

The corundum is duplicating translucent, hard in a high degree, pretty easily frangible, and approaches to heavy. It is supposed to occur imbedded in granite, syenite, or green-stone, and is found in the Carnatic and on the coast of Malabar. See CORUNDUM.

Fourteenth Species. Diamond Spar.

The colour is a dark hair brown. It occurs massive, disseminated, in rolled pieces, and crystallized in six-sided prisms, or very acute six-sided pyramids. Internally, its lustre is splendent, approaching in a slight degree to adamantine. It may be cut so as to present an opalescent star of six rays, of a peculiar pearly light.

It is translucent on the edges, hard in a high degree, easily frangible, and not particularly heavy.

The diamond spar probably occurs in granite. It has hitherto been found only in China. Both this stone and corundum are employed in cutting and polishing hard minerals, and they seem to be nearly allied to each other.

Fifteenth Species. Emery.

Emery is hard in the highest degree, not very easily frangible, and is heavy. It occurs in beds of talc and steatite, and is frequently accompanied with calcspar and blende. It is found in Saxony, in the islands of the Archipelago, in Spain, Normandy, and is said also to be a native of the isles of Guernsey and Jersey.

It is of great use in cutting and polishing hard bodies.

Sixteenth Species. Topaz.

The chief colour is a wine-yellow, of all degrees of intensity. It is found massive, disseminated, and sometimes rolled, but most commonly crystallized in oblique eight-sided or four-sided prisms, which exhibit several varieties. The crystals are small and middle-sized, externally splendent; internally splendent, and shining: lustre vitreous.

The topaz alternates from translucent to transparent, and is duplicating transparent. It is hard in a high degree, easily frangible, and is not particularly heavy. It is fusible with borax; and some kinds in a gentle heat turn white, and are sometimes sold for diamonds.

It is commonly found in veins that traverse primitive rocks in Brazil, Siberia, in Pegu, and Ceylon; in Bohemia, Saxony, and in Cornwall. Exhibiting various forms and tints, it has often been confounded with other precious stones. It is much used in seals and rings.

Seventeenth Species. Emerald.

The green called emerald is the characteristic colour of this species, but it has all degrees of intensity from deep to pale. It is said to occur massive and in rolled pieces, but most commonly crystallized in low equiangular six-sided prisms. The crystals are middle-sized and small. Internally the lustre is intermediate between shining and splendent, and is vitreous. It alternates from transparent to translucent, and is duplicating transparent.

The emerald is hard, not particularly heavy, melts easily with borax, but is scarcely fusible before the blow-pipe. It occurs in veins that traverse clay-slate, and at present is only found in South America, particularly in Peru, though the Romans are said to have procured it from Egypt and Ethiopia.

From the beauty and vivacity of its colour, the charming emblem of the vegetable kingdom, this precious stone is much admired, and employed in the most expensive kinds of jewellery. See EMERALD.

Eighteenth Species. Beryl.

This is divided into two sub-species, the precious and the schorlous beryl. See BERYL, and fig. 8.

Nineteenth Species. Schorl.

This is divided into two sub-species, common schorl and tourmaline.

Twentieth Species. Thumerstone.

The colour is commonly clove-brown, of various degrees of intensity. It is occasionally found massive, more frequently disseminated, but generally crystallized in very flat and oblique rhombs. Externally, its lustre is generally splendent; internally, it alternates from glistening to shining, and is vitreous.

This species alternates from perfectly transparent to weakly translucent. It is pretty hard, very easily frangible, and not particularly heavy. It appears to be peculiar to the primitive mountains, and is found imbedded in limestone in Saxony, Dauphiny, Norway, Siberia, and Cornwall.

Twenty-first Species. Iron-Flint.

The colour a yellowish-brown, bordering on liver-brown. It occurs commonly massive, but also crystallized in small equiangular six-sided prisms. Externally, its lustre is splendent; internally, shining, and is intermediate between vitreous and resinous.

Iron-flint is opaque, and slightly translucent on the edges. It is pretty hard, somewhat difficultly frangible, and approaching to heavy. It occurs in iron-stone veins, and is found in Saxony, and, according to Karsten, at Bristol. It renders the iron ore, along with which it is dug, very difficult of fusion.

Twenty-second Species. Quartz.

Werner divides this into five sub-species, amethyst, rock crystal (fig. 9.), milk-quartz, common quartz, and prase. The first sub-species is again subdivided into common amethyst and thick fibrous amethyst. See QUARTZ, AMETHYST, &c.

Twenty-third Species. Horn-Stone.

Horn-stone is divided into three sub-species, splintery horn-stone, conchoidal horn-stone, and wood-stone.

First Sub-species. Splintery Horn-Stone.

The common colour grey, but often red, with various shades of each. It is usually found massive, or in large balls. Internally its lustre is dull; but glimmering when it approaches to the nature of quartz. It is more or less translucent on the edges, hard, brittle, very difficultly frangible, and not particularly heavy.

The substance is infusible without addition; and is found in the shape of balls in lime-stone, and sometimes forming the basis of porphyry. It is a native of Bavaria, Sweden, and the Shetland islands; and appears to differ from quartz in containing a larger proportion of alumina.

Second Sub-species. Conchoidal Horn-Stone.

The colour runs from greyish-white to yellowish and greenish-white. It occurs massive. Internally, it is a little glistening, strongly translucent on the edges, hard, easily frangible, and not particularly heavy.

Conchoidal horn-stone is found in beds or in veins, accompanied with agate, at Goldberg, in Saxony.

Third Sub-species. Wood-Stone.

The prevailing colour is ash-grey, but with many different shades. Its shape is exactly conformable to its former woody form, whether trunk, branches, or roots. Internally, it is sometimes dull, and sometimes glimmering and glistening; slightly translucent on the edges, pretty hard, easily frangible, and not particularly heavy.

It is found insulated in sandy loam in Saxony, Bohemia, Russia, Hungary, and at Loch Neagh in Ireland. It receives a good polish, and is applied to the same purposes as agate

Twenty-fourth Species. Flint.

The general colour is grey, but with many varieties. It occurs massive, in regular plates, in angular grains and species, in globular and elliptical rolled pieces, in the form of sand, and tuberose and perforated. Sometimes it is crystallized, when it exhibits double six-sided prisms, or flat double three-sided pyramids. Internally, the lustre is glimmering, translucent on the edges, hard, easily frangible, and not particularly heavy.

Twenty-fifth Species. Chalcedony.

This is divided into two sub-species, chalcedony and cornelian.

First Sub-species. Common Chalcedony.

The most common colour is grey. The external shape is various, being massive, in blunt-edged grains and rolled pieces, in original round balls, &c. &c. Internally, the chalcedony is almost always dull, commonly semitransparent, hard, brittle, rather difficultly frangible, and not particularly heavy. It occurs in ampydaloid, and in porphyry; and is found in Transylvania, in Iceland, Siberia, Cornwall, Scotland, and the Hebrides. Being susceptible of a fine polish, it is employed as an article of jewellery. See CHALCEDONIUM.

Second Sub-species. Cornelian.

The principal colour is a blood-red, of all degrees of intensity. It commonly occurs in roundish pieces, and also in layers: the lustre is glistening, bordering on glimmering, and is semitransparent. See CORNELIAN, and CHALCEDONIUM.

Agate.

The fossils known under this name are all compound substances; and hence cannot have a particular place in any systematic arrangement. Werner therefore has placed them as a supplement to the species chalcedony, which forms a principal constituent part of them, and disposes them according to their colour-delineations, thus: 1. Fortification agate; 2. Landscape agate; 3. Ribbon agate; 4. Moss agate; 5. Tube agate; 9. Clouded agate; 7. Land agate; 8. Star agate; 9. Fragment agate; 10. Punctuated agate; 11. Petrifaction agate; 12. Coal agate; 13. Jasper agate. They are all compounded of chalcedona, cornelian, jasper, horn-stone, quartz, heliotrope, amethyst, indurated lithomarge, and opal, in different quantities and proportions, and are found in great abundance in Germany, France, England, Scotland, Ireland, and the East Indies.

The uses of agate are various. It is cut into vases, mortars, snuff-boxes, seals, handles to knives, and for many other useful purposes. See AGATE and CHALCEDONIUM.

Twenty-sixth Species. Heliotrope.

The principal colour is intermediate between leek and dark celadon green, or mountain green. It occurs massive, and in angular as well as rolled pieces. Internally the lustre is glistening, and is always resinous It is commonly translucent in the edges; is easily frangible, hard, and not particularly heavy.

Heliotrope is found in rocks belonging to the floetz trap formation, in Asia, Persia, Siberia, Saxony, and Iceland.

On account of its beautiful colour and its hardness, it is employed for nearly the same purposes as agate. See HELIOTROPE.

Twenty-seventh Species. Plasma.

The usual colour is intermediate between grass and leek-green, and of different degrees of intensity. It occurs in indeterminably angular pieces, which have a rough earthy crust. Internally its lustre is glistening. It is intermediate between semitransparent and strongly translucent, hard, brittle, frangible without great difficulty, and not particularly heavy.

Hitherto it has only been found among the ruins of Rome, and constituted a part of the ornamental dress of the ancient Romans.

Twenty-eighth Species. Chrysopras.

Its characteristic colour is apple-green, of all degrees of intensity. It is found massive in angular pieces, and in thick plates. Internally it is dull; the lustre intermediate between translucent and semitransparent. It is hard, not very difficultly frangible, nor particularly heavy; and is found along with quartz, opal, chalcedony, &c. at Kosemutz, in Lower Silesia.

Chrysopras is principally used for ring-stones, and some varieties are highly esteemed; but it is difficult to cut and polish.

Twenty-ninth Species. Flinty Slate.

This has been divided into two sub-species, common flinty slate, and Lydian stone.

First Sub-species. Common Flinty Slate.

The principal colour is grey, but there are many varieties of shades. It occurs massive in whole beds, and frequently in blunt-angled pieces, with a smooth and glimmering surface. Internally it is faintly glimmering; more or less translucent on the edges; hard, brittle, difficultly frangible, and not particularly heavy.

It occurs in beds in transition mountains in Saxony, at the lead-hills in Scotland, and other places.

Second Sub-species. Lydian Stone.

The colour is greyish-black, passing into velvet-black. It occurs massive, and is frequently found in trapezoidal-shaped rolled pieces. Internally it is glimmering; opaque, hard, pretty easily frangible, and not particularly heavy. It is found in similar formations with the preceding, near Prague and Carlsbad in Bohemia, in Saxony, and in the Moorfoot and Pentland hills, near Edinburgh.

When polished, it is used as a test-stone for determining the purity of gold and silver; but is less suited for this purpose than basalt, and some kind of clay slate.

Thirtieth Species. Cat's Eye.

The principal colour is grey, of which it presents many varieties. It occurs in blunt-edged pieces, in rolled pieces, and likewise massive. Internally it is shining; usually translucent, and sometimes also semi-transparent. It is hard, easily frangible, and not particularly heavy.

Its geognostic situation is unknown. It is imported from Ceylon and the coast of Malabar; and is usually cut for ring-stones. Some of the varieties are highly valued.

Thirty-first Species. Prehnite.

The colours are various shades of green, white, and yellow. It is sometimes massive, and sometimes crystallized in oblique four-sided tables. Externally, the crystals are smooth and shining; internally, inclining to glistening and pearly.

Prehnite is translucent, sometimes passing into semi-transparent and transparent: it is hard, easily frangible, and not very heavy. It occurs in Dauphiny in viens of the oldest formation; in Scotland in rocks belonging to the newest floetz trap formation; and was first discovered in Africa by colonel Prehn, from whom it receives its appellation.

Thirty-second Species. Zeolite.

This species is divided by Werner into five sub-species, 1. Mealy zeolite. 2. Fibrous zeolite. 3. Radiated zeolite. 4. Foliated zeolite. 5. Cubic zeolite. As they are principally distinguished from each other by fracture, hardness, and lustre, we shall only observe, that the chief colours of all are yellowish, whitish, and reddish, with a variety of intermediate shades; that zeolite occurs massive, in angular pieces, in balls, and sometimes chrystalized in short and oblique four-sided prisms, and in perfect smooth planed cubes; that it is according to the sub-species opaque, translucent, or even transparent; and that it is semi-hard, easily frangible, and not particularly heavy.

Zeolite occurs in rocks belonging to the newest formation, but is sometimes, though rarely, found in primitive green stone, either disseminated, in cotemporaneous balls, or lining or filling up air cavities or veins. All the different sub-species are natives of Scotland. The mealy zeolite is found in the Isle of Sky; the fibrous and radiated in the isles of Canary and Sky; the foliated in Staffa, and the cubic in the same isle, and likewise in Sky. They are likewise met with in Iceland, in Sweden, in Germany, and the East Indies.

Thirty-third Species. Cross-stone.

The colour is a greyish-white. It occurs crystalized, either in broad rectangular four-sided prisms, or in twin crystals. The crystals are mostly small, and aggregated on one another. Both the internal and the external lustre is shining, inclining to splendent or glistening.

The cross-stone is translucent passing to transparent, semi-hard, easily frangible, and not particularly heavy. It has hitherto been found only in mineral veins, and in agate-balls at Strontian, in Argyleshire, and at Andreasberg, in Hartz, as well as some other places.

Thirty-fourth Species. Agate-stone.

The colour is a perfect azure blue, of different shades. It is found massive, disseminated, and in rolled pieces. The lustre is glistening and glimmering. It is translucent on the edges, pretty hard, brittle, easily frangible, and not particularly heavy.

The geognostic situation is not correctly ascertained It is said to have been found near the lake of Baikal, in Siberia, in a vein accompanied with garnet, felspar, and pyrites. It occurs in Persia, China, Tartary, and Siberia; in South America; but in Europe has only been found among the ruins of Rome.

Its beautiful colour renders it an object of attraction, and being capable of receiving a high polish, it is applied to various useful purposes, and enters into the composition of many different ornaments. It is the lapis lazuli of painters. Werner is constantly making additions to his species under every genus.

Of those belonging to the flint genus, which are less known, and have been described with less precision than the preceding, are coccolite, found in Sweden and Norway; pistazite, found in Norway, Bavaria, and France; ceylanite, in Ceylon; enclase, in Peru; hyalite, near Frankfort; menilite, near Paris; lomonite, in Lower Britanny; natrolite, in Suabia; azurite, in Stiria, &c.; andalusite, or hardspar, in Saxony, France, and Spain; chiastolite, or hollow spar, in France and Spain, and probably in Cumberland; scapolite, in Norway; arctizite, or wernerite, in Sweden, Norway, Switzerland; and lazulite.

FOURTH GENUS.

CLAY *Genus.*

First Species. Jasper.

This is divided into six sub-species; Egyptian jasper, striped jasper, porcelain jasper, common jasper, agate jasper, and opal jasper.

Second Species. Opal.

Werner divides this into four sub-species, precious opal, common opal, semi-opal, and wool opal.

Third Species. Pitch-stone.

The colours are black, green, brown, red, and occasionally grey. It occurs always massive in great beds and rocks. Internally, its lustre is shining. It is commonly translucent in a small degree, brittle, and pretty easily frangible.

Pitch-stone is fusible without addition: occurs in beds of the newest porphyry and floetz trap formation; and is found in Saxony, Hungary, in several of the Hebrides, and in Dumfriesshire. Some of its varieties bear a striking resemblance to pitch, from whence it receives its appellation.

Fourth Species. Obsidian.

The principal colour is velvet-black. It always occurs in angularly roundish-pieces. Internally it is splendent. Some of the varieties are translucent, others semi-transparent. It is hard, easily frangible, and not very heavy.

Obsidian occurs insular in the newer porphyry formation, and is found in Hungary, Iceland, in Peru, and various other countries. When cut and polished, it is sometimes used for ornamental purposes, and mirrors for telescopes have been formed of it. It probably owes its origin to fire.

Fifth Species. Pearl-stone.

Its colour is generally grey, sometimes black and red. It occurs vesicular, and the vesicles are long and roundish, with a shining pearly lustre. It is translucent on the edges, not very brittle, very easily frangible, and rather light.

Pearl-stone is found in beds of porphyry, near Tokay, in Hungary, in the north of Ireland, and the Hebrides.

Sixth Species. Pumice-stone.

Its usual colour is a light yellowish-grey, passing into different neighbouring shades. It is small, and lengthened vesicular: its internal lustre glistening, generally translucent in the edges, soft, and seldom semi-hard, very brittle, easily frangible, and swims in fluids.

It occurs in various situations, generally accompanied by rocks that belong to the floetz trap formation; and though usually classed among volcanic productions, in some situations it evidently is of aquatic origin. It is found in the Lipari islands, in Hungary, Iceland, and on the banks of the Rhine; and is used for polishing stones, metals, glass, and ivory; and also for preparing parchment.

Seventh Species. Felspar.

Is divided into four sub-species; compact felspar, common felspar, adularia, and Labradore stone.

Eighth Species. Pure Clay.

Is snow white, with occasionally a yellowish tinge, and occurs in kidney-shaped pieces, which have no lustre. It is opaque, soils very little, adheres slightly to the tongue, is light, and intermediate between soft and friable.

Pure clay is found immediately under the soil, accompanied with foliated gypsum and selenite, at Halle, in Saxony, only.

Ninth Species. Porcelain Earth.

The colour is generally a reddish-white, of various degrees of intensity. It occurs massive and disseminated; its particles are fine and dusty, slightly cohering, and feeling fine and light.

It is found in beds in gneiss, accompanied with quartz and other substances, in Saxony, at Passau, Limoges, and in Cornwall. In China and Japan, where it is called kaolin, it is very abundant. It forms the basis of china ware.

Tenth Species. Common Clay.

This is divided into six sub-species, as follow:

1. Loam, of a yellowish-grey colour, frequently spotted with yellow and brown, and occurring massive. It is dull and weakly glimmering, colours a little, adheres pretty strongly to the tongue, and feels slightly greasy. It is often mixed with sand, gravel, and iron ochre.

2. Potter's clay is of two kinds, earthy and slaty. The earthy is of a yellowish and greyish-white colour in general; occurs massive; is opaque, colours a little, feels somewhat greasy, and adheres strongly to the tongue. Slaty potter's clay is generally of a dark ash-grey colour, and feels more greasy than the preceding. It occurs in great rock masses, and in alluvial land. Both kinds are universally distributed, and are of great importance in the arts and in domestic economy.

3. Pipe clay is greyish-white, passing into yellowish-white, occurring massive, of a glimmering lustre, and having its particles pretty coherent. It feels rather greasy, is easily frangible, and adheres pretty strongly to the tongue.

4. Variegated clay is commonly white, red, and yellow, striped, veined, and spotted. It occurs massive, is soft, passing into friable, feels a little greasy, and adheres somewhat to the tongue. It is found in Upper Lusatia.

5. Clay-stone is commonly grey or red, with various intermediate tints. It occurs massive, is dull, opaque, soft, pretty easily frangible, feels rather meagre, and does not adhere to the tongue. It forms vast rock masses, occurs in beds and veins, and is found in Saxony, in Scotland, and in Shetland.

6. Slate clay is of a grey colour, presenting several varieties. It is massive, internally dull, opaque, pretty soft, mild, easily frangible, adheres a little to the tongue, and feels meagre. It is generally found wherever the oval, floetz trap, and alluvial formations occur.

Eleventh species. Polier, or polishing-stone,

Is of a yellowish-grey colour, striped, and the colours alternate in layers. It occurs massive, is dull, very soft, adheres to the tongue, feels fine but meagre, and is nearly swimming. It is found in the vicinity of pseudo-volcanoes, though hitherto it has only been discovered in Bohemia.

Twelfth species. Tripoli

Is of a yellowish-grey colour, passing into ash-grey; occurs massive, is internally dull, very soft, feels meagre and rough, does not adhere to the tongue, and is rather light. It is found in veins and beds in floetz rocks in Saxony, in Derbyshire, and many other countries besides Tripoli, from whence it was first brought. Its use in polishing metals and minerals is well known.

Thirteenth species. Alum-stone

Is of a greyish-white colour, occurs massive, shews a tendency to crystallization, is soft, passing to friable, and light. It is found at Tolfa, near Rome, from whence the famous Roman alum is manufactured.

Fourteenth species. Alum-earth.

The colour is a blackish-brown, and brownish-black; it is massive, dull, feels a little meagre, and somewhat greasy; is intermediate between soft and friable, and light. It is found in beds of great magnitude in alluvial land, and in floetz trap formation in several parts of Germany, in Naples, and in France. It is lixiviated to obtain the alum it contains.

Fifteenth species. Alum-slate

Is divided into two sub-species, as follow:

1. Common alum-slate is between a greyish and blueish-black colour, occurs massive, and in balls, is soft, not very brittle, easily frangible, and not very heavy.

2. Glossy alum-slate is of an intermediate colour, between blueish and iron-black; occurs massive, with a shining semi-metallic lustre, and in other respects resembles the former. It is found in beds and strata in Saxony, France, Scotland, and Hungary; and affords considerable quantities of alum.

Sixteenth species. Bituminous shale

Is of a brownish-black colour, and occurs massive. Internally, its lustre is glimmering; it is very soft, rather mild, feels rather greasy, is easily frangible, and not particularly heavy.

It is found with clay slate in the coal formation, in Bohemia, England, Scotland, and other coal countries.

Seventeenth species. Drawing slate, or black chalk.

Its colour is a greyish-black, with a tinge of blue; it occurs massive, is opaque, colours and writes, is soft, mild, easily frangible, feels meagre but fine, and is rather light.

It is found in primitive mountains in France, Germany, Iceland, Scotland, and the Hebrides. When of a middling degree of hardness, it is used for drawing.

Eighteenth species. Whet-slate.

The common colour is greenish-grey; it is massive; internally, weakly glimmering, semi-hard, feels rather greasy, and is not particularly brittle or heavy. It occurs in primitive mountains in Saxony, Bohemia, and the Levant. When cut and polished, it is used for sharpening knives and tools.

Nineteenth species. Clay-slate.

Its principal colour is grey, of which there are many varieties. It occurs massive; internally its colour is glistening, the substance opaque, soft, pretty easily frangible. It is found in vast strata in primitive and transition mountains in many different countries, but particularly in Scotland. When split into thin and firm tables, it is used for roofing houses, and other purposes.

Twentieth species. Lepidolite.

Its colour is a kind of peach-blossom, red, verging on lilac-blue, and occurs massive. Its internal lustre is glistening; it is translucent, soft, easily frangible, and easily melts before the blowpipe. Hitherto it has only been found in Moravia, where it lies in gneiss.

Twenty-first species. Mica, or Glimmer.

Its common colour is grey, of great variety of shades. It occurs massive, disseminated in thin tables and layers in other stones, and crystallized either in equilateral six-sided tables, or in six-sided prisms. The surface of the crystals is splendent; internally, shining and splendent. In thin plates, it is transparent; but in larger masses only translucent on the edges. It is semi-hard, feels smooth but not greasy, elastically flexible, and more or less easily frangible.

It forms one of the constituent parts of granite, gneiss, and mica slate, and is almost peculiar to the primitive mountains. It was formerly used instead of glass, for windows and lanterns.

Twenty-second species. Pot-stone.

Its colour is a greenish-grey, of different degrees

of intensity; is massive; lustre, internally, glistening and pearly, translucent on the edges; soft, feels greasy, and is very difficultly frangible.

It occurs in beds, or is indular; and is found in the country of the Grisons, in Saxony, and probably in Hudson's-bay, and is nearly allied to indurated talc.

Twenty-third species. Chlorite,

Which see.

Twenty-fourth species. Hornblende,

Which see.

Twenty fifth species. Basalt.

The usual colour is greyish-black, of various degrees of intensity. It occurs massive in blunt and rolled pieces, and sometimes vesicular. Internally, it is commonly dull. It is usually found in distinct concretions, which are generally columnar, and sometimes upwards of 100 feet in length. Commonly opaque, semi hard, brittle, very difficultly frangible, melts without addition, and is almost exclusively confined to the floetz trap formation. It occurs in strata, beds, and veins, in almost every quarter of the globe, and is very abundant in Scotland, Ireland, and in other parts of the British European dominions. It is useful for building, as a touch-stone, as a flux, and in glass manufactures.

Twenty-sixth species. Wacke.

The colour is a greenish-grey, of various degrees of intensity. It occurs massive and vesicular, is dull, somewhat glimmering, opaque, usually soft, more or less easily frangible, and not particularly heavy.

It is said to belong exclusively to the floetz trap formation, where it occurs in beds and above clay, and also in veins. It is found in Saxony, Bohemia, and Sweden.

Twenty-seventh species. Clink-stone

Is commonly of a dark greenish-grey colour, always massive, and occurring in irregular columns, and tabular distinct concretions. It is usually translucent on the edges, brittle, easily frangible, and when struck with a hammer sounds like a piece of metal.

It is said to belong to the floetz trap formation, and generally rests on basalt. It is found in Lusatia, Bohemia, South America, and in the isle of Lambash, in the frith of Clyde.

Twenty-eighth species. Lava

Is divided into two sub-species:

1. Slag lava is of a greyish-black colour, passing into other shades. Externally it is spotted, occurs vesicular and knotty, is generally opaque, semi-hard, brittle, easily frangible, and not particularly heavy.

2. Foam lava is of a dark greenish-grey colour, occurs small and fine, vesicular; externally, glimmering, slightly translucent on the edges, brittle, easily frangible, and light. It has often been confounded with pumice-stone, from which, however, it differs very much. On account of its lightness, it is used with advantage in arching vaults and other kinds of building.

Twenty-ninth species. Green Earth.

Its colour is a celaden green, of various degrees of intensity. It occurs massive, in angular and globular pieces, and also disseminated. Internally, it is dull, streak glistening, very soft, easily frangible, and light.

It is principally found in amygdaloid, in Saxony, Bohemia, Scotland, and other places, and is used by painters.

Thirtieth species. Lithomarge

Is divided into two sub-species.

1. Friable lithomarge, or rockmarrow, is snow-white, or yellowish-white, occurs massive, as a crust, and disseminated; is generally coherent, feels greasy, and adheres to the tongue. Is found in tin veins, in Saxony.

2. Indurated lithomarge is most commonly white, of which it presents several varieties; is massive; internally dull; streak shining, very soft, easily frangible, feels greasy, and adheres strongly to the tongue. It occurs in veins of porphyry, &c. in Saxony, Bohemia, Bavaria, &c.

Thirty-first species. Rock Soap

Is of a brownish or pitch-black colour, massive and disseminated, dull, opaque, does not soil, writes like drawing-slate, is easily frangible, and adheres strongly to the tongue.

It is found imbedded in rocks of the floetz trap formation, in Poland, and in the isle of Sky, but is very rare, and found only in small quantities.

Thirty-second species. Yellow Earth.

The colour is ochre-yellow, of different degrees of intensity; it is massive, streak somewhat shining, soils, writes, is very soft, adheres pretty strongly to the tongue, and feels somewhat greasy. It occurs in beds with iron-stone, in Upper Saxony, and is employed as a pigment.

To the clay genus, likewise, belong adhesive slate, float-stone, pinite, and umber, which may be considered as recent discoveries.

FIFTH GENUS.

TALC *Genus.*

First Species. Bole.

Its colour is cream-yellow, passing into various other shades; is commonly massive, very soft, easily frangible, feels greasy, gives a shining streak, adheres to the tongue, and is light. It occurs in rocks belonging to the newest floetz trap formation, and is found in beds of wacke or basalt, in Silesia, Italy, &c. It was formerly employed in medicine, but is now used only as a pigment.

Second species. Native Talc Earth.

The colour is yellowish-grey, passing into cream-yellow. It occurs massive, tuberose, and of other shapes; is internally dull, almost opaque, soft, frangible without much difficulty, and adheres a little to the tongue.

It is found in beds of serpentine, but only hitherto in Moravia.

Third species. Meerschaum.

The usual colour is yellowish-white. It occurs massive, is internally dull, opaque, streak shining, is soft, adheres strongly to the tongue, feels a little greasy, and is nearly swimming. It is principally found in Natolia, in Samos, Hungary, Moravia, Spain, and America. It is much used in the manufacture of heads of tobacco-pipes. It is said that the Turks eat it as a medicine.

Fourth species. Fuller's Earth.

The colours are greenish-white, grey, olive, and oil-green. It is massive; internally dull, usually opaque, gives a shining streak, is very soft, feels greasy, and is not particularly heavy.

It is found in different situations in England, Saxony, Alsace, and Sweden; and is of essential use in cleansing woollen cloth, from which property it receives its name.

Fifth species. Neaphrite,

Which see.

Sixth species. Steatite.

The principal colour is white, of which it presents many varieties. It occurs massive, disseminated, in crusts, and crystallized in six-sided prisms. Internally it is dull, streak shining, very soft, rather difficultly frangible, and feels greasy.

It is found in beds and veins in serpentine in Norway, Sweden, Saxony, England, Scotland, and China. It is used in the manufacture of porcelain, and for other purposes.

Seventh species. Serpentine,

Which see.

Eighth species. Schiller-stone.

Its colour is olive-green, usually disseminated and massive; lustre shining, is soft, slightly brittle, and easily frangible. It occurs imbedded in serpentine, and is found in the Harz, in Saxony, Cornwall, and Ayrshire. It is often confounded with Labradore hornblende.

Ninth species. Talc.

This is divided into three sub-species.

1. Earthy talc is of an intermediate colour between greenish-white and light greenish-grey; friable, strongly glimmering, soils a little, feels rather greasy, and occurs in tin veins near Freyberg in Saxony.

2. Common or Venetian talc is principally of an apple-green colour, massive and disseminated, and in delicate and small tabular crystals. It is almost always splendent and shining, translucent, in thin leaves transparent, flexible, but not elastic; soft, easily frangible, feels very greasy, and approaches to light.

It is almost wholly confined to the primitive mountains, where it is found imbedded in serpentine, and also in veins. It is found in the Tyrolese Alps, in Switzerland, and in Saxony.

3. Indurated talc is of a greenish-grey colour, of various degrees of intensity, occurs massive, is shining, passing to glistening, strongly translucent on the edges, soft, feels rather greasy, and is frangible without particular difficulty. It is found in primitive mountains in Tyrol, Austria, Scotland, and the Shetland isles.

Tenth species. Asbest.

See Asbestos.

Eleventh species. Cyanite,

Which see.

Twelfth species. Actynolite

Is divided into the following sub-species:

1. Asbestous actynolite is of a greenish-grey colour, occurs massive, disseminated, and in capillary crystals; is internally glistening, translucent on the edges, soft, brittle, not easily frangible, nor particularly heavy. It is found in mineral beds in Saxony, and other parts of Germany.

2. Common actynolite is generally of a green leak-colour, passing into other shades of the same; it occurs massive, and likewise crystallized in very oblique six-sided prisms, is splendent externally, semi-hard, rather brittle, and not easily frangible.

It is found in beds in primitive mountains, in Saxony, Switzerland, Norway, and Scotland.

3. Glassy actynolite is principally of a mountain-green colour, of various degrees of intensity; occurs massive, or in thin six-sided acicular crystals, is shining and vitreous, strongly translucent, brittle, easily frangible, semi-hard, and is found in similar situations with the preceding.

Thirteenth species. Tremolite.

This is divided into the following sub-species:

1. Asbestous tremolite is of a whitish colour with a tinge of yellow, grey, red, or green: it occurs massive, and in capillary and acicular crystals; internally glistening, very soft, easily frangible, and translucent on the edges.

2. Common tremolite is nearly of the same colour as the preceding, occurs massive, and in long and very oblique four-sided prisms: internally, is shining and glistening, translucent and semi-transparent, semi-hard, and pretty easily frangible.

3. Glassy tremolite is yellowish, reddish, greyish, and greenish-white; occurs massive, and crystallized. Internally, is shining and pearly; is composed of very thin prismatic concretions, which are again collected into very thick prismatic concretions. It is translucent, brittle, and pretty easily frangible, and is said to emit a phosphoric light when rubbed in the dark.

Tremolite is principally found imbedded in primitive mountains, particularly the mountains of Tremola, in Switzerland. It is also found in different parts of Germany, and in Scotland.

Sahlite, lately discovered in Sweden, likewise belongs to the talc genus.

SIXTH GENUS.

Calc Genus.

First species. Rock Milk.

Its colour is yellowish white; it is composed of dully, dusty particles generally weakly cohering, feels meagre yet fine, soils very much, and is very light. It is found in fissures and holes of mountains composed of floetz lime-stone, in Switzerland.

Second species. Chalk.

Its colour is principally all yellowish-white: it occurs massive, disseminated, and as crust over flint. Internally, is dull, opaque, soils, writes, soft, sometimes very soft, very easily frangible, feels meagre, and rather rough; effervesces strongly with acids, and is found principally on the sea-coast, though the Chiltern range in England is wholly composed of it. It is used for polishing and cleansing metals, glass, &c. and in some places as a manure, and cement in building.

Third species. Lime-stone

Is divided into several sub-species:

1. Compact lime-stone is of two varieties, common compact lime-stone, and roe-stone. The former is generally of a grey colour, but is frequently veined, zoned, striped, or clouded; occurs massive, and in rolled pieces; is translucent on the edges, semi-hard, brittle, pretty easily frangible; is almost entirely confined, like lime in general, to the floetz mountains; occurs in sand, stone, and coal formations, in England, Scotland, and many other countries; and is frequently used for building or making roads, or when burnt, for manure and cement.

The latter, or roe-stone, is of a chesnut-brown

colour, is massive; internally dull, composed of small and fine-grained globular distinct concretions; semi-hard, brittle, not very easily frangible; occurs in beds in considerable quantities in Saxony, and is solely used for manure, for which its admixture with marle admirably fits it.

2. Foliated lime-stone is likewise of two kinds, granular lime-stone, and calc spar. The former is commonly whitish, but presents many varieties of that colour; is massive, occurs almost always in granular distinct concretions, is more or less translucent, semi-hard, brittle, easily frangible, is peculiar to the primitive and transitive mountains, and is chiefly found in Italy, whence it is distributed over Europe, for the purpose of statuary. The white marble of Paros, or granular limestone, has long been celebrated. Scotland furnishes some beautiful varieties of marbles, whose uses are well known.

The latter, or calc spar, is principally white, but has many shades. It occurs massive, disseminated, and crystallized, either in six-sided prisms or three-sided prisms. The lustre alternates from splendent to shining and glistening, and is most commonly vitreous. The massive varieties are translucent, and sometimes even transparent. It is found venigenous in almost every rock from granite to the newest floetz trap, occurs in a great variety of mineral veins, and is very universally disseminated, but is found particularly beautiful in Derbyshire, in Ireland, Saxony, France, and Spain.

3. Fibrous lime-stone, is of two varieties, common fibrous lime-stone, and fibrous lime-stone, or calc sinter. The former is commonly greyish, reddish, or yellowish-white; massive. lustre glistening, fragments splintery, more or less translucent, semi-hard, and occurs only in small veins.

The latter, or calc sinter, is principally white, of which it exhibits several beautiful varieties; occurs massive, and also in many particular external forms; internally is glimmering and pearly. It is commonly found in curved lamellar distinct concretions, is more or less translucent, semi-hard, brittle, and easily frangible; it is discovered in almost every lime-stone country. The grotto of Antiparos, and similar situations, afford striking instances of calc sinter. It is the alabaster of the ancients, and is still used in statuary.

4. Pea-stone is commonly yellowish-white, massive, internally dull, opaque or translucent on the edges; soft, very easily frangible; and is found in great masses in the vicinity of the hot springs at Carlsbad in Bohemia. It is composed of spherically round distinct concretions. All the varieties of lime-stone effervesce with acids.

Fourth species. Schaum, or foaming earth,

Is principally of a light yellowish colour; occurs massive and disseminated; is intermediate between shining and glistening; presents large, coarse, small, and fine-grained distinct concretions; is generally opaque, soft, completely friable; feels fine, but not greasy, and cracks a little. It is found in cavities of the oldest floetz lime-stone in Thuringia, and in the north of Ireland.

Fifth species. Slate spar.

Its colour milky, and greenish or reddish-white; occurs massive; lustre intermediate between shining and glistening, and completely pearly; fragments slaty, translucent, soft, and pretty easily frangible. It is found in lime-stone beds in primitive mountains, and is produced in Norway, Saxony, and Cornwall.

Sixth species. Brown spar.

This is divided into the following sub-species:

1. Foliated brown spar, is principally white and red, with several varieties of each. It occurs massive, globular, with tabular impressions, and frequently crystallized, externally shining, internally alternating from shining to splendent. It is found in granular distinct concretions of all magnitudes; is more or less translucent, semi-hard; a little difficultly frangible, and occurs in veins generally accompanied with calc spar, &c. in the mines of Norway, France, Germany, England, and other countries.

2. Fibrous brown spar is of a flesh-red, passing into rose-red; occurs massive, lustre glistening, fragments splintery, in other respects resembling the preceding. Hitherto it has been found only in Hungary and Transylvania.

Seventh species. Rhomb spar.

Its colours are yellowish and greyish-white, occurs only in regular middle-sized rhombs; lustre splendent, generally intermediate between translucent and semi-transparent; is semi-hard, brittle, easily frangible, and is found imbedded in rocks belonging to the talc genus in Switzerland, Sweden, and on the banks of the Loch-lomond in Scotland.

Eighth species. Schaal-stone.

The most common colour is greyish-white; it occurs massive, is shining and nearly pearly, translucent, pretty hard, brittle, easily frangible, and has been hitherto found only in the Bannat of Tameswar, accompanied by copper ore.

Ninth species. Stink-stone.

Its colour is wood-brown, passing into various other shades. It occurs massive, and sometimes disseminated through gyps, is dull or glimmering internally, translucent on the edges, rather soft, easily frangible, and when rubbed, emits an urinous smell. It is found in considerable quantities in the district of Mansfield in Thuringia.

Tenth species. Marle,

Which see.

Eleventh species. Bituminous marle slate.

Its colour is intermediate between greyish and brownish-black; it is massive, from glimmering to shining, fragments slaty, usually soft, not very brittle, easily frangible, and streak shining. It is found in beds along with the oldest floetz limestone, and contains much copper intermixed with it, on account of which it is usually smelted in Thuringia.

Twelfth species. Calc tuff.

The colour is yellowish-grey; it is generally perforated or marked with the impressions of other substances, also amorphous, ramose, and corroded. Internally dull, substance opaque, soft, easily frangible, and approaching to swimming. It occurs in alluvial land, and is found in Thuringia, at Gotha, and other places in Germany.

Thirteenth species. Arragone.

The principal colours are greenish-grey, and iron-grey. It occurs crystallized in perfect equiangular six-sided prisms; the lustre is glistening, passing into shining, and is vitreous; it is semi-hard, brittle, not

particularly heavy, and plurpluresces a little. It was first discovered in the province of Arragon, whence its name, imbedded in gyps, but has since been found in some other countries of the continent.

Fourteenth species. Appatite.

The usual colours are white, green, blue, and red; it generally occurs crystallized, the radical form of which is the equiangular six-sided prism. Externally it is splendent, internally shining and resinous. It is commonly transparent, semi-hard, brittle, easily frangible, and occurs in tin veins in Saxony, Bohemia, and in Cornwall. It has been confounded with schorl, &c.

Fifteenth species. Asparagus or spargel stone.

The principal colour is asparagus-green; it occurs, only crystallized in equiangular six-sided prisms, is internally shining, most frequently translucent, semi-hard, easily frangible, and brittle. Hitherto it has been found only in Murcia in Spain, though supposed to be produced in Norway. It is nearly allied to appatite.

Sixteenth species. Boracite.

Its colours are yellowish, smoke and greyish-white, passing to asparagus-green; it occurs in crystallized cubes, with the edges and angles truncated, internally shining, commonly semi-transparent, semi-hard, brittle, and easily frangible. Hitherto it has been discovered only at Luneburg in Hanover.

Seventeenth species. Fluor.

Which see.

Eighteenth species. Gyps.

This is divided into the following sub-species:

1. Gyps earth is of a yellowish-white colour, passing into some allied shades, is intermediate between fine scaly and dusky, dull and feebly glimmering, soils a little, feels meagre but soft and fine, and is light. It is found, though rarely, in gyps countries, and is formed in the same manner as rock milk. It is used as a manure.

2. Compact gyps, is commonly ash-grey, passing into smoke and yellowish grey, is massive, internally dull, feebly translucent on the edges, very soft, frangible without great difficulty, and is employed in architecture, and sculpture, under the name of alabaster.

3. Foliated gyps is commonly white, grey, or red, presenting spotted, striped, and veined colour delineations. It occurs massive, and in blunt-edged pieces, but seldom in crystals. Internally it alternates from shining and glistening to glimmering, is translucent and duplicating, very soft, and not particularly difficultly frangible. It has been confounded with granular lime-stone.

4. Fibrous gyps is principally white, grey, and red, with various shades of each. It occurs massive and dentiform, the internal lustre is usually glistening and pearly, commonly semi-transparent and translucent, very soft, and easily frangible.

Fossils belonging to the gyps formation occupy different situations. They are found in Switzerland, Thuringia, Derbyshire, Cornwall, Moffat in Scotland, and other places.

Gyps, when burnt, forms an excellent cement, and is used for many ornamental purposes.

Nineteenth species. Selenite.

Its principal colour is snow-white, passing into other neighbouring shades: is generally massive, but not unfrequently crystallized in pretty oblique six-sided prisms, the crystals seldom large, but internally shining and splendent. Fig. 12.

Selenite is completely transparent, soft, somewhat flexible, not very frangible, and is found in the oldest gyps formation, in single crystals in clay beds in the newest formation, and in other situations. It is common in Thuringia, at Montmartre near Paris, Shotover near Oxford, and in the isle of Sheppy. It is employed in taking the most delicate impressions, for crayons and other purposes.

Twentieth species. Cube spar.

The colour is milk-white with various allied shades. It is massive, occurring in large, coarse, and small ground distinct concretions. The lustre is shining, passing into splendent, translucent, softish, very easily frangible, and not particularly heavy. It is found in salt rocks in Salzbourg.

To the calc genus are also referred phosphorite, which forms a great bed in Estremadura in Spain; and the anhydrite, found in the duchy of Wirtemberg.

SEVENTH GENUS.

BARYTE *Genus.*

First species. Witherite.

Is commonly of a light yellowish-grey colour generally massive, but sometimes crystallized in six-sided prisms, or double six-sided pyramids. The lustre of the principal fracture is shining; the fragments generally wedge-shaped. It is translucent, somewhat semi-hard, brittle, easily frangible, and pretty heavy. Fig. 13.

It melts, without addition, before the blowpipe, into a white enamel, and occurs in veins along with heavy spar, lead-glance, &c. at Anglesark in Lancashire. Combined with muriatic acid it may be used in medicine, though a very active poison of itself.

Second species. Heavy spar or baryte.

See BARYTES.

EIGHTH GENUS.

STRONTIAN *Genus.*

First species. Strontian.

The usual colour is intermediate between asparagus and apple-green; it occurs most commonly massive, but sometimes crystallized in a circular six-sided prism. The crystals are scopiformly and manipularly aggregated. The lustre of the principal fracture is shining, of the cross fracture glistening. It is translucent in a greater or less degree, soft, and semi-hard, brittle, easily frangible, dissolves in acids with effervescence, and occurs along with lead-glance, heavy spar, &c. at Strontian in Argyleshire, the only place where it has yet been found.

Second species. Celestine

Is divided into two sub-species:

1. Fibrous celestine, is of an intermediate colour, between indigo-blue and blueish-grey; it occurs massive and in plates, and also crystallized, showing a tendency to prismatic distinct concretions; is translucent, soft or semi-hard, easily frangible, and pretty heavy. It is found in Pennsylvania and in France.

2. Foliated celestine, is of a milky-white colour, falling into blue; it occurs massive, and also crystallized in six-sided tables intersecting each other. It has a glistening lustre, is strongly translucent, softish, not particularly brittle, easily frangible, and hard. It occurs sometimes in sulphur beds, and is

found very finely crystallized in Sicily, and likewise near Bristol.

CLASS II.

FOSSIL SALTS.

The substances included in this class are confined to those which are found in a natural state only; and the greater part of them appear to be formed by the agency of water, air, &c.

The distinguishing characters of fossil salts are, their taste and easy solution. They resemble each other so closely, that the term saline consistence is used to express whatever relates to hardness, tenacity, and frangibility.

First species. Natron, or natural soda.

It may be divided into the two following sub-species:

1. Common natron, is of a yellowish or greyish-white colour, occurs in fine flakes or in dusty particles, has a sharp alkaline taste, effervesces with nitric acid, is easily soluble in water, and strikes blue vegetable tinctures green. It occurs as an efflorescence in the surface of soil, or on the sides and bottoms of lakes that occasionally become dry. It is found in very large quantities in Hungary, Bohemia, and Egypt, and in many other countries of the Old World.

2. Radiated natron, or natural soda, is of a greyish or yellowish-white colour, occurs in crusts or crystallized in capillary or acicular crystals, is glistening and translucent, and is found in large quantities in the province of Sukana in Barbary, and in Southern Africa.

Natron is principally employed in the manufacture of glass, soap, and for washing. It is also used as a flux after being purified.

Second species. Natural nitre.

The colour is greyish or yellowish-white, approaching to snow-white; it is flaky, sometimes verges to solid and massive, is of a saline consistence, and tastes saltly cooling. Placed on hot iron, it hisses and detonates; is usually found in thin crusts on the surface of the soil at particular seasons of the year, particularly in hot climates. It is also met with in various countries of Europe, and is much used in making gunpowder, in medicine, and the arts. The greatest part, however, employed for those purposes, is an artificial preparation from the refuse of animal and vegetable bodies undergoing putrefaction, and mixed with calcareous and other earth.

Third species. Natural Rock-salt

Is divided into two sub-species:

1. Rock or stone-salt, which is of two kinds, foliated and fibrous. The former is commonly of a white or grey colour, occurs massive and disseminated, and also crystallized in cubes; in general is strongly translucent, rather hard, easily frangible, and feels somewhat greasy. The latter is greyish, yellowish, and snow-white; occurs massive, is strongly translucent, verging to semi-transparent, decrepitates when laid on burning coals, and is found in beds lying over the first or oldest floetz trap formation. It forms whole hills at Cordova in Spain, is found also in Germany, and almost every country in the world. At Nantwich in Cheshire it has long been dug. Its use is as general as its dissemination. It is employed as a daily seasoning for our food, as a manure, in various manufactures, and for purposes too numerous to mention.

2. Lake-salt occurs either in thin plates, which are formed on the surface of salt-lakes, or in grains at their bottom. It is translucent, and of a saline consistence. It is found in Cyprus, near the Caspian Sea, and in various parts of Africa.

Fourth species. Natural sal ammoniac.

The colour is commonly greyish or yellowish-white. It is of a saline consistence, and is flaky, with an urinous taste. It is sometimes found massive, stalactitic, tuberose, botryoidal, and crystallized. It is the product of volcanoes and pseudo-volcanoes, and is found in Italy, Sicily, in the vicinity of inflamed beds of coal both in England and Scotland, and in several countries of Asia.

Fifth species. Natural Epsom salt.

Colour a greyish-white. It occurs in capillary efflorescences, and is mealy or flaky, of a saline consistence, and taste saltly bitter. It is found as an efflorescence, on clayey stones or gyps rocks, at Sena, at Solfatara, in Hungary and Bohemia. It is also contained in many mineral springs, particularly those of Epsom, whence it derives its name. Epsom salts are much used as an easy purgative. Considerable quantities of magnesia may be obtained from them.

Sixth species. Natural Glauber salt.

The colour is usually greyish and yellowish-white. It occurs in the form of mealy efflorescences, in crusts, and sometimes crystallized in acicular and in six-sided prismatic crystals. Internally it is shining, with a vitreous lustre, is soft, brittle, easily frangible, and has a cooling but a saltly bitter taste.

It is found on the borders of salt-lakes, on moorish ground, on old and new-built walls in different countries of Europe, Asia, and Africa, and is used as a purgative medicine, and in some places as a substitute for soda in the manufacture of white glass.

Seventh species. Natural alum

Is of a yellowish or greyish-white colour; occurs as a mealy efflorescence, or in delicate capillary crystals; has a sweetish astringent taste, and is produced in various situations in Scotland, Germany, Italy, Spain, Sweden, and in Egypt.

Alum is employed as a mordant in dyeing, in the manufacture of leather, as a medicine, for preventing wood from catching fire, and for preserving animal substances from putrefaction.

Eighth species. Hair salt.

The principal colours are snow, yellowish, and greyish-white. It occurs in delicate capillary crystals; has a saline consistence, and a sweetish astringent taste.

Hair salt is found in different mine countries on the continent, at Whitehaven in England, and near Paisley in Scotland, and bears a striking resemblance to fibrous gyps.

Ninth species. Rock butter.

The colour is light-yellow or greyish-white. It occurs massive and tuberose, is translucent, has a saline consistence, or sweetish-sour astringent taste, and feels a little greasy. It oozes out of fissures of rocks of alum slate, and is found in Lusatia, Thuringia, Denmark, Siberia, and near Paisley in Scotland.

Tenth species. Natural vitriol

Is divided into the three following sub-species:

1. Iron vitriol, is commonly of an emerald and

verdigris green. It occurs massive, tuberose, stalactitic, and crystallized in different figures; is splendent and vitreous, has a saline consistence, and a sourish astringent taste. It is found usually along with iron pyrites, by the decomposition of which it is formed, in different countries of continental Europe, in many of the English mines, and in America. It is employed to dye linen yellow, and wool and silk black, in the preparation of ink, as a paint, &c.

2. Copper vitriol, is usually of a dark sky-blue colour. It occurs massive, disseminated, stalactitic, dentiform, and crystallized; is translucent, soft, very brittle, and has a styptic taste. It is found in various mining countries, in Wicklow, and in Anglesea. It is used in cotton and linen printing, and when prepared is employed by painters.

3. Zinc vitriol, is of a greyish, yellowish, reddish, and greenish-white colour. It occurs tuberose, stalactitic, and coralloidal, is translucent, of a saline consistence, and a styptic taste. It is produced most abundantly where much blende occurs, and is found in Austria, Hungary, and Sweden.

Here it must be remarked, that borax, though so well known by name, is without a place in the Wernerian system, as it is uncertain whether or no it occurs in a solid state. It is most probable that it occurs only in solution in certain lakes. See BORAX.

The new genus stallite, of which only one species, cryolite, has been found in Greenland, seems properly to come under this head.

CLASS III.

INFLAMMABLE FOSSILS.

Fossils belonging to this class are light, brittle, mostly opaque, yellow, brown, or black, seldom crystallized, and never feel cold. They are more nearly allied to the metallic than to the earthy or saline classes.

FIRST GENUS.

SULPHUR *Genus*.

First species. Natural sulphur.

It contains the two following sub-species:

1. Common natural sulphur, is of the colour the name expresses, but of different degrees of intensity. It occurs massive, disseminated, and crystallized in octahedrons or double six-sided pyramids, is internally between shining and glistening, translucent, in crystals frequently transparent, very soft, easily frangible, and light.

It is found in masses in gyps, in veins that traverse primitive rocks, in nests of limestone, and in other situations, and is produced in every quarter of the world, though in the British dominions it seems to be confined to Ireland.

2. Volcanic natural sulphur is of the colour the name imports, but with a considerable tinge of green. It occurs corroded, vesicular, perforated, amorphous, and sometimes as a sublimate in flowers, is glistening and resinous, and translucent in a slight degree. It is found only in volcanic countries, and among lava, but is produced in great abundance; and is employed in medicine, in the composition of gunpowder, and as a vapour in whitening wool and silk.

SECOND GENUS.

BITUMINOUS *Genus*. SEE BITUMEN.

First species. Brown coal. See COAL.

FOURTH GENUS.

GRAPHITE *Genus*.

First species. Glance coal.

This is divided into two sub-species:

1. Conchoidal glance coal, is of an iron-black colour, of different degrees of intensity, occurs massive and vesicular, internally shining, bordering sometimes on splendent, brittle, easily frangible, and light. It burns without flame or smell, and has hitherto been found only in the newest floetz mass formation, accompanied with other kinds of coal, at Meissner in Hessia. The fracture is conchoidal.

2. Slaty glance coal, is of a dark iron black colour, occurs massive, is shining and glistening, soft, very easily frangible, light, and intermediate between sectile and brittle. It is found imbedded in masses, beds, and veins, in primitive, transitive, and floetz rocks, and is produced in Spain, Savoy, Saxony, Bohemia, and in the isle of Arran in Scotland. Its principal fracture is more or less slaty.

Second species. Graphite.

This contains two sub-species:

1. Scaly graphite, is commonly of a dark steel-grey colour. It occurs massive and disseminated, is usually glistening, fracture scaly-foliated, is very soft, perfectly sectile, writes and soils, feels very greasy, and is rather difficultly frangible.

2. Compact graphite, is rather blacker than the preceding, is internally glimmering with a metallic lustre, fracture fine-grained, in other respects agrees with the preceding. It usually occurs in beds, and is found near Keswick in England, in Ayrshire in Scotland, and in various other parts of Europe, Asia, and Africa. The finer kinds are first boiled in oil, and then cut into pencils. The coarser parts and sawings are melted with sulphur, and then cast into coarse pencils for the use of artificers. It is likewise applied to various other purposes, under the vulgar name of black lead.

Third species. Mineral charcoal.

The colour is a greyish-black. It occurs in small angular and somewhat cubical-shaped pieces, is glimmering, with a silky lustre, soils strongly, is soft, and light. It is found in thin layers in different kinds of coal, and is widely disseminated.

FIFTH GENUS.

RESIN *Genus*. See RESINS.

First species. Amber.

This is divided into the two following sub-species:

1. White amber, is of a straw-yellowish colour. It occurs massive, and sometimes associated with the following sub-species, is glistening with a resinous lustre, fracture conchoidal, and simply translucent.

2. Yellow amber, is of a wax-yellow colour, passing into several neighbouring shades. It occurs always in indeterminately angular blunt-edged pieces, is externally dull, internally splendent, with a vitreous and resinous lustre. It is transparent, soft, rather brittle, pretty easily frangible, light, and swimming. It burns with a yellow-coloured flame, emitting an agreeable odour; when rubbed, it acquires a strong negative electrical virtue; is found in layers of bituminous wood, and in moor coal, on sandy se-

shores, and frequently floating on the sea. It is chiefly produced on the coasts of Prussia, in Sweden, Norway, &c. and according to some has been found in the alluvial land near London. It admits of a fine polish, and is cut into necklaces, bracelets, snuff-boxes, and various other articles. The oil and acid obtained from it are used in medicine.

Second species. Honey-stone.

See MELLITES.

CLASS IV.

METALLIC FOSSILS.

FIRST GENUS. *Platina.*

First species. Native platina.

The colour is very light steel-grey, approaching to silver-white. It occurs in flat, smooth, and smallish grains, externally shining, lustre metallic, intermediate between semihard and soft, completely malleable, pretty flexible, and very heavy, its specific gravity being about 15.6.

Platina is the least fusible of metals, and does not amalgamate with mercury. It has hitherto been found only in sand accompanied with other metals, and is produced in South America, and probably also in St. Domingo and Barbadoes. From the peculiar qualities it possesses of resisting the action of many salts, of remaining unaltered in the air, and of receiving a fine polish, it has been rendered subservient to several purposes in chemistry and the arts. See PLATINUM.

SECOND GENUS. *Gold.*

First species. Native Gold.

This is divided into three sub-species:

1. Gold-yellow native gold, is of a perfect colour, corresponding to its name. It seldom occurs massive, often disseminated in membranes, in roundish and flattish pieces, in grains, and also crystallized in cubes, octahedrons, simple three-sided pyramids, garnet dodecahedrons, and acute double eight-sided pyramids. External lustre of the crystals is splendent; internally it is glimmering, passing into glistening. It is soft, completely malleable, flexible, and uncommonly heavy. It is found in veins, beds, disseminated in rocks, and in grains, in almost every country of the world, but commonly in too small quantities to be collected for use. America and Africa supply the largest quantities.

2. Brass-yellow native gold, is principally of the colour of brass, occurs disseminated, capillary, moss-like, reticulated, and in leaves, also crystallized in thin six-sided cubes, and is rather lighter than the preceding. It is found in different situations in Bohemia, Transylvania, and Norway.

3. Greyish-yellow native gold, is of a brass-yellow colour falling into steel-grey, occurs in very small flattish grains like platina, and is found with that metal. See AURUM.

THIRD GENUS. *Mercury.* See HYDRARGYRUM.

First species. Native mercury, or quicksilver.

The colour is tin-white: it occurs perfectly fluid in globules, is splendent, and has a metallic lustre, does not wet, feels very cold, and is uncommonly heavy. Before the blowpipe it is volatilized, without any smell. It is usually found in cinnabar at Idria. It occurs in a compact limestone, and here it is very abundant. It is likewise produced in different parts of Germany, France, Spain, and in very large quantities in Peru.

The uses of quicksilver are multifarious, and cannot be enumerated in this place.

Second species. Natural amalgam.

Fluid, or semi-fluid amalgam, is of an intermediate colour between tin and silver-white. It occurs in small massive pieces, and in balls, also disseminated and crystallized in different forms. Externally it is shining and splendent, is soft and somewhat fluid; when cut or pressed, it emits a creaking sound like natural amalgam, and is uncommonly heavy.

Third species. Mercurial horn-ore, or corneous mercury,

Is of an ash-grey colour of various degrees of intensity; occurs very rarely massive, but commonly in small vesicles, internally crystallized and splendent. It is soft, sectile, easily frangible, and heavy. It is usually found with the other species of mercury, and is produced in the same countries. It was first discovered in the mines of the Palatinate.

Fourth species. Mercurial liver-ore, or mercurial hepatic-ore.

Compact mercurial liver-ore, is of an intermediate colour between dark-red and lead-grey, occurs massive, is glistening and glimmering internally, opaque, soft, sectile, easily frangible, and uncommonly heavy. It is the most common ore of mercury at Friaul in Idria.

Fifth species. Cinnabar.

Dark-red cinnabar, is principally of a perfect cochineal red, occurs massive, disseminated, in blunt-cornered pieces, in membranes, amorphous, dendritic, fruticose, and crystallized. The crystals are small, splendent externally, and shining internally. The massive cinnabar is opaque or translucent on the edges, very soft, sectile, easily frangible, and uncommonly heavy.

Bright-red cinnabar is of a lively scarlet-red colour. It occurs massive and disseminated, is internally glimmering, substance opaque, streak shining, soils, is very soft, sectile, very easily frangible, and very heavy. Both belong to the same countries with quicksilver. In Idria, Spain, and Peru, this genus is most abundant. It does not occur in Norway, Sweden, Great Britain, or Ireland. From the ore of cinnabar the greatest part of the mercury used in commerce is obtained.

FOURTH GENUS. *Silver.*

First species. Native silver.

Common native silver is of the colour the name expresses. It occurs massive, disseminated, in pieces, plates, and membranes, as well as in other forms, besides being crystallized in cubes, octahedrons, four-sided rectangular prisms, double six-sided pyramids, double three-sided pyramids, and hollow four-sided pyramids. It is soft, perfectly malleable, common flexible, and very heavy when pure. It appears to belong to the newer primitive rocks, where it occurs in veins, and is usually accompanied with heavy spar and quartz.

Second species. Antimonial silver.

The colour is intermediate between tin-white and silver-white. It occurs massive, disseminated,

and crystallized, is externally glistening, internally shining and splendent, with a metallic lustre. It is found in coarse, small, and fine granular distinct concretions, is sectile, not very difficultly frangible, soft, and uncommonly heavy. It contains upwards of 80 parts of silver. It occurs in veins composed of calx, spar, &c. in Spain, Germany, and other countries.

Third species. Arsenical silver.

The colour is tin-white, passing into silver-white. It occurs massive, disseminated, globular, and crystallized; is softish, sectile, and very heavy. It contains about 12 parts of silver, much arsenic and iron, and is usually found with native arsenic and other minerals in Germany and Spain, but is a rare mineral.

Fourth species. Corneous silver-ore, or horn-ore.

The colour is most frequently a pearl-grey, of all degrees of intensity. It occurs massive, disseminated, in membranes, balls, and also crystallized in cubes and in acicular and capillary crystals. It is more or less translucent, soft, perfectly malleable, and heavy. It contains upwards of 60 parts of silver, and is found always in veins. It is widely distributed over the globe, but it is most abundant in South America. It is sometimes found in Cornwall, and receives its name from cutting like horn.

Fifth species. Silver-black.

The colour is a blueish-black, whence its name. It occurs massive, disseminated, and in various other forms, of all degrees of consistence, from friable to solid. It gives a shining metallic streak, soils very little, is easily frangible, sectile, and heavy. It is found with silver-glance and hornore in Hungary, Bohemia, Norway, and Siberia.

Sixth species. Silver-glance

Is of a dark-blackish lead-grey colour, occurs usually massive, disseminated, in membranes, &c. and also crystallized in cubes, octahedrons, garnet dodecahedrons, and double eight-sided pyramids. Externally it is shining and glistening; internally it alternates from shining to glistening, and has a metallic lustre. It is soft, completely malleable, pretty flexible, and uncommonly heavy, containing upwards of 80 parts of pure silver; and is found in veins, along with native silver and other minerals, in Hungary, Austria, and other countries of Europe, but more particularly in Mexico and Peru.

Seventh species. Brittle silver-glance.

The colour is intermediate between iron-black and dark lead-grey. It occurs massive, disseminated, in membranes, and frequently crystallized in equiangular six-sided prisms, and rectangular four-sided tables. Externally it is highly splendent, internally shining and glistening. It is soft, brittle, easily frangible, and uncommonly heavy, containing upwards of 60 parts of silver. It is found always in veins, accompanied with other minerals, and principally in Hungary and Saxony.

Eighth species. Red silver-ore.

Dark-red silver-ore is intermediate between cochineal red and lead-grey. It occurs massive, disseminated, dendritic, in membranes, and crystallized in equiangular six-sided prisms. It is externally splendent; internally it alternates from shining to glimmering. The massive varieties are opaque; the crystallized passing from semi to transparent. It is soft, sectile, easily frangible, and heavy.

This species occurs always in veins, accompanied with other minerals, and is found in Bohemia, Hungary, Norway, and other countries.

Ninth species. White silver-ore.

The colour is a very light lead-grey. It occurs massive and disseminated, has a metallic lustre, a shining streak, is soft, slightly flexible, easily frangible, and heavy. It contains large quantities of lead, sulphur, and antimony, and scarcely 10 parts of silver. It is always found in veins, and chiefly near Freyberg.

Tenth species. Black silver-ore.

The principal colour is iron-black, inclining to steel-grey. It occurs massive, disseminated, and crytallized in three-sided pyramids. Internally it is shining with a metallic lustre. It is semihard, sectile, easily frangible, and heavy. See ARGENTUM.

FIFTH GENUS, *Copper*. See CUPRUM.

First species. Native copper.

The colour is copper-red, but frequently tarnished. It occurs massive, disseminated, and in various other forms, besides being crystallized in cubes, dodecahedrons, &c. It is intermediate between semihard and soft, completely malleable, common flexible, difficultly frangible, and very heavy. It is usually found in veins and sometimes in beds, and is produced in Cornwall, Anglesea, the Shetland islands, and many other countries of Europe, Asia, and America. Copper may be applied to a vast number of useful purposes, and is next to iron the most necessary of metals.

Second species. Copper-glance.

Compact copper-glance is usually of a dark lead-colour, passing into blackish-grey. It occurs massive, disseminated, in membranes, and occasionally chrystallized; externally shining, internally between shining and glistening. It is soft, perfectly sectile, easily frangible, and heavy.

Third species. Variegated copper ore.

Its colour, when dug, is intermediate between copper-red and pinchbeck-brown, but it soon becomes tarnished. It occurs massive, disseminated in plates, membranes, and crystallized in octahedrons. It is soft, slightly sectile, easily frangible, and heavy; and is found in beds, veins, and rocks of different formations, in Cornwall, and various parts of continental Europe. It yields about 70 parts of pure copper.

Fourth species. Copper pyrites.

When fresh, its colour is brass-yellow, of different shades according to its richness. It occurs massive, disseminated in membranes, &c. and also crystallized in various figures. Externally it is intermediate between glistening and shining, internally soft; is between semihard and soft, brittle, easily frangible, and heavy.

Fifth species. White copper ore

Is of an intermediate colour between silver-white and bronze-yellow: occurs massive and disseminated; is internally glistening, with a metallic lustre; rather soft, brittle, easily frangible, and heavy. It is found in veins and mineral beds in primitive mountains, and is produced in Cornwall, in different parts of Germany, in Siberia,

and in South America; but it is one of the rarest species of copper ore.

Sixth species. Grey copper ore, or Fahl ore.

The most common colour is steel-grey: it occurs massive, disseminated, and also crystallized in tetrahedrons, octahedrons, and garnet dodecahedrons. It is more or less semihard, brittle, easily frangible, and heavy; and is found in the newer primitive rocks, and likewise in transitive and floetz rocks, in several mines of Cornwall, in Germany, Italy, Sweden, Norway, Siberia, and Chili. It is usually smelted on account of the copper it contains.

Seventh species. Copper black.

The colour is usually intermediate between blueish and brownish-black: it occurs massive, or disseminated, and as a coating, to other ores of copper; is always more or less cohering, and heavy, containing from 40 to 50 parts of copper. It is usually found with copper pyrites, &c. and is produced in Silesia, Germany, France, Sweden, Norway and Siberia. Sometimes it is very beautiful.

Eighth species. Red copper ore.

Compact red copper is usually of a dark cochineal-red colour: occurs massive, in membranes, crowded, amorphous, and also disseminated. Internally it is glimmering, inclining to glistening, with a semimetallic lustre: it is opaque, semihard, brittle, easy frangible, and heavy.

Ninth species. Tile ore.

Earthy tile ore is usually of a red hyacinth colour; massive, disseminated, and incrusting copper pyrites; is intermediate between friable and solid, soils slightly, is almost always coherent, and is heavy. It is found in veins, commonly accompanied with native copper ore and malachite.

Tenth species. Copper azure.

Earthy copper azure is of a smalt-blue colour; usually friable, and disseminated; is composed of dusty particles, does not soil, is chiefly cohering, and approaches to heavy. It is found in small quantities, usually accompanied with malachite and copper green, in different parts of Germany, in Norway, and Siberia.

Eleventh species. Malachite, which see.

Twelfth species. Copper green.

The principal colour is verdigris-green, of different degrees of intensity: it usually occurs massive, disseminated, and coating malachite: is internally shining; more or less translucent, soft, not very brittle, easily frangible, and intermediate between heavy and not particularly heavy. It is found in the same geognostic situation with malachite, in Cornwall and other counties, but is rare.

Thirteenth species. Iron-shot copper green.

Earthy iron-shot copper green is usually of an olive-green colour: occurs massive, and disseminated; is dull, soils a little, soft, passing into friable, not very brittle, easily frangible, and not particularly heavy.

Fourteenth species. Copper emerald.

The colour is an emerald-green. It occurs in crystallized six-sided prisms, which are externally and internally shining, with a vitreous lustre, and translucent. It is semihard, brittle, and not particularly heavy; and is found in the remoter parts of the Russian dominions, and on the Chinese frontiers.

Fifteenth species. Copper mica

Is usually of an emerald-green colour: it occurs massive, disseminated, and occasionally crystallized in very thin six-sided tables. Externally it is smooth and splendent, internally splendent, with a pearly lustre. The massive varieties are translucent; the crystallized transparent. It is soft, sectile, not very brittle, nor particularly heavy; and has hitherto been found only in veins in Cornwall, where it passes under the unscientific name of foliatic arseniat of copper.

Sixteenth species. Lenticular ore.

The colour is sky-blue, sometimes passing into verdigris green. It occurs crystallized in small, flat, double, four-sided pyramids; is externally shining; translucent, soft, rather brittle, and very easily frangible. Hitherto it has been found only in Cornwall.

Seventeenth species. Oliven ore.

Foliated oliven ore is of a perfect olive-green: seldom occurs massive, usually in drusy crusts, and in small crystals, presenting acute rhomboids, and oblique four-sided prisms. Internally it is glistening, with an adamantine lustre. It is very soft, sectile, and heavy in a low degree; and has hitherto been found only in Cornwall.

SIXTH GENUS. *Iron.*

First species. Native iron

Is of a light steel-grey colour, inclining to silver white: it has hitherto been found only ramose; internally it is intermediate between glimmering and glistening, with a perfect metallic lustre, and a hackly fracture. It is between soft and semihard, perfectly malleable, common flexible, difficultly frangible, and uncommonly heavy. Hitherto it has been found only in loose masses on the surface of the earth, and is a rare production.

Second species. Iron pyrites.

Common iron pyrites is usually of a perfect bronze-yellow colour: it occurs massive, disseminated in membranes, and also crystallized in cubes, octahedrons, dodecahedrons, icosahedrons, and leuzite crystals. It is hard, brittle, and heavy, and when rubbed or struck with steel, emits a strong sulphureous smell. It occurs in almost every kind of mineral repository, but most commonly in granite; its geographic distribution is equally extensive, but it is principally valued on account of the sulphur which may be extracted from it by sublimation.

Third species. Magnetic pyrites

Is of an intermediate colour between bronze-yellow and copper-red: it occurs massive and disseminated; is internally shining, with a metallic lustre, passes from hard to semi-hard, is brittle, easily frangible, and heavy. It is attracted by the magnet; is found only in primitive mountains, in Caernarvonshire, in several parts of Germany, in Norway and Siberia; and is used for the same purposes as common pyrites.

Fourth species. Magnetic iron-stone.

Common magnetic iron-stone is of an iron-black colour: is massive, disseminated, and also crystallized in cubes, octahedrons, and garnet dodecahedrons, and rectangular four-sided prisms. It is externally shining; internally between splendent and glistening, with a metallic lustre: is intermediate between hard and semihard, brittle, and heavy. It occurs most frequently in primitive mountains, and is found in the Shetlands, many parts of Germany, and other countries, particularly Sweden. When pure, it affords excellent bar iron.

Fifth species. Iron glance.

Common iron glance is usually of a dark steel-grey colour, with several different shades. It commonly occurs massive and disseminated, and also crystallized in flat, double, three-sided pyramids, and in double three-sided pyramids. Externally it alternates from splendent to glistening; internally it is most commonly glistening. It is hard, brittle, heavy, and rather difficultly frangible. It occurs in beds and veins in primitive and transitive mountains, and is found in considerable quantities in Sweden and other countries, and affords, when smelted, an excellent malleable iron.

Sixth species. Red iron-stone.

Red iron froth. The colour is intermediate between cherry-red and brownish-red. It occurs commonly friable, massive, sometimes coating and disseminated, and is composed of scaly particles, which are glimmering, and have a semi-metallic lustre. It soils strongly, feels greasy, and is pretty heavy. It is found usually in veins, and chiefly in primitive mountains in Lancashire, Cornwall, Norway, Germany, and Chili, and produces good iron.

Seventh species. Brown iron-stone.

Brown iron froth is of an intermediate colour between steel-grey and clove-brown, and is between friable and solid. It occurs massive, coating, spumous, &c. and is composed of scaly particles, shining and glistening, with a metallic lustre. It soils strongly, feels greasy, and is very light. It is commonly found lining drusy cavities, in brown hematite, in the Shetland isles, in various parts of Germany, and in Chili.

Eighth species. Sparry iron-stone.

The principal colour is a light yellowish-grey, which, on exposure to the air or heat, changes into brown or black. It occurs massive, disseminated, with pyramidal impressions, in plates, and crystallized. It is found in granular distinct concretions, commonly translucent on the edges, semihard, not very brittle, easily frangible, and heavy. It is chiefly confined to the primitive and floetz mountains, and is produced in small quantities in England, Scotland, and Ireland; but on the continent it is in some places very abundant, and affords an iron which is excellently adapted for steel-making.

Ninth species. Black iron-stone.

Compact black iron-stone, is of an intermediate colour between blueish-black, and dark steel-grey: it occurs massive, tuberose, reniform, &c. It is semihard, brittle, easily frangible, and heavy.

Tenth species. Clay iron-stone.

Reddle is of a light brownish-red, passing into cherry-red: it occurs only massive; soils strongly, and writes, is sectile, easily frangible, and rather heavy. It is chiefly found in the newer clay-slate, and is produced pretty abundantly in Germany and Siberia. The coarser varieties are used by the carpenter, the finer by the painter, under the name of red-chalk.

Eleventh species. Bog iron-ore.

Morass ore is of a yellow-brown colour, sometimes friable, sometimes coherent, and occurs massive, corroded, in grains, and tuberose. It soils pretty strongly, feels meagre but fine, and is lightish.

Twelfth species. Blue iron-earth.

When fresh it is whitish, but soon becomes of an indigo-blue colour, of different degrees of intensity; it occurs massive, disseminated, and thinly coating; the particles are dull and dusty; it soils slightly, feels fine, and is lightish. It is found in nests in clay-beds, and other situations, in the Shetland isles, Iceland, Sweden, and Siberia.

Thirteenth species. Green iron-earth.

Friable green iron-earth is of a siskin-green colour, occurs massive and disseminated, is more or less cohering, soft, fine, easily frangible, and intermediate between particularly heavy and heavy.

Fourteenth species. Cube ore.

The colour is olive-green, of different degrees of intensity; it occurs massive, and crystallized in small cubes, is translucent, soft, brittle, and not particularly heavy. It is found in veins, but hitherto only in Cornwall. See FERRUM.

SEVENTH GENUS. *Lead.*

First species. Lead glance.

Common lead glance is of a fresh lead-grey colour, of different degrees of intensity; it occurs massive, disseminated, in membranes, &c. and also crystallized in cubes, octahedrons, four-sided prisms, six-sided prisms, and three-sided tables. It is soft, sectile, externally easily frangible, and uncommonly heavy; and is found in veins and beds in primitive, transitive, and floetz mountains, at lead-hills in Lanarkshire, Derbyshire, and several other counties of England, Scotland, and Wales; besides being widely diffused over other parts of the globe. It is most frequently worked as an ore of lead, but sometimes as an ore of silver.

Second species. Blue-lead ore

Is of an intermediate colour between dark indigo-blue and lead-grey; it occurs massive, and crystallized in perfect six-sided prisms, is soft, sectile, easily frangible, and heavy, and is found in veins with other minerals of the same class, but is altogether a rare fossil, nor has it hitherto been discovered in Britain.

Third species. Brown-lead ore.

Is of a hair-brown colour of different degrees of intensity; it occurs massive, and crystallized in six-sided prisms, is feebly translucent, soft, not very brittle, easily frangible, and intermediate between heavy and uncommonly heavy. It is found in veins, accompanied with other minerals, in Bohemia, Hungary, Brittany, and Saxony.

Fourth species. Black-lead ore.

The colour is greyish-black, of different degrees of intensity; it occurs massive, disseminated, and crystallized in six-sided prisms; externally is usually splendent, internally shining with an adamantine lustre, is rather brittle, easily frangible, and heavy.

It is found in veins, and almost always accompanied with other kinds of lead-ore, at lead-hills in Scotland, Bohemia, Saxony, and other mineral countries.

Fifth species. White-lead ore.

The colour is white, but has various shades; it occurs massive, disseminated, in membranes, but most commonly crystallized in prisms and pyramids, of different figures. Externally, it is specular splendent, internally between splendent and glistening, with an adamantine lustre. It is soft, brittle, very easily frangible, and heavy, and is found in most places where the other species occur, in England, Wales, Scotland, Ireland, &c. Next to lead glance it is the most common of the lead ores, but is seldom in sufficient abundance to become an object to the metallurgist.

Sixth species. Green-lead ore.

Its colour is grass-green, of various shades; it generally occurs crystallized, in six-sided prisms, is always translucent, soft, rather brittle, very easily frangible, and heavy. It is produced in Scotland and other countries, and is sometimes confounded with the preceding species.

Seventh species. Red-lead ore.

Its general colour is a hyacinth-red; it occurs massive but rarely, sometimes in membranes, but most commonly crystallized in broad oblique four-sided prisms, is both externally and internally splendent, very soft, between brittle and sectile, easily frangible, and heavy. It is found in veins in gneiss and mica slate, accompanied with other fossils of the same kind, in Austria, Savoy, and Siberia, and on account of its beautiful colour is chiefly used as a pigment.

Eighth species. Yellow-red ore.

Its principal colour is wax-yellow; it is generally crystallized in rectangular four-sided tables, cubes, octahedrons, equiangular eight-sided tables, and double eight-sided pyramids. Externally, it is shining and smooth, internally glistening, with a resinous lustre; it is translucent, soft, between brittle and sectile, easily frangible, and heavy. It is found in compact lime-stone in Carinthia, and some other countries of the continent.

Ninth species. Lead vitriol, or vitriol of lead.

The colour is yellowish-grey and greyish white; it occurs only crystallized in octahedrons of different figures. Externally it is shining, internally splendent, with an adamantine lustre. It is often semi-transparent, rather brittle, and heavy, and is found in Scotland, Anglesea, and Spain.

Tenth species. Lead earth.

Coherent lead earth is usually of a yellowish-grey colour; it occurs massive is internally glimmering, usually opaque, soft, inclining to sectile, easily frangible, and heavy. It is found in primitive lime-stone in Derbyshire, Scotland, and many other countries. See PLUMBUM.

EIGHTH GENUS. *Tin.*

First species. Tin pyrites.

The colour is intermediate between steel-grey and brass-yellow; it occurs massive and disseminated. Internally is glistening, and has a metallic lustre, is semihard, brittle, easily frangible, and heavy. It melts easily, and has hitherto been found only in Cornwall.

Second species. Tin stone.

The most common colour is blackish-brown; it occurs massive, disseminated, in rolled pieces, in grains, like sand, but most frequently crystallized in prisms and pyramids of different figures. Internally it is shining and glistening, it yields a greyish-white streak, is hard, easily frangible, brittle, and very heavy. It is found only in primitive rocks, and is confined to a few situations, like all the tin genus.

Third species. Cornish tin ore, or wood tin.

The most usual colour is hair-brown, of different degrees of intensity; it occurs usually in rolled pieces, sometimes reniform with impressions. It is found usually in large and coarse granular distinct concretions, is opaque, hard, brittle, easily frangible, and uncommonly heavy. It is infusible, and hitherto has only been found in Cornwall in alluvial land, accompanied with tin stone. See STANNUM.

NINTH GENUS. *Bismuth.*

First species. Native Bismuth.

Its colour is silver-white, with an inclination to red; it occurs massive, disseminated in leaves, reticulated, and crystallized in small four-sided tables, and in small and indistinct cubes, and three-sided pyramids. It is soft, sectile, rather difficultly frangible, and uncommonly heavy; and is found in veins in primitive mountains in Saxony, and other parts of the continent; but it is doubtful if produced in Britain.

Second species. Bismuth glance.

The colour is a light lead-grey; it occurs massive, disseminated, and in acicular and capillary crystals; it soils, inclines to sectile, is easily frangible, and heavy. It is found always in veins, and is usually accompanied with native bismuth, chiefly in Saxony, Bohemia, and Hungary.

Third species. Bismuth-ochre.

The colour is a straw-yellow, passing into other neighbouring shades; it is massive and disseminated, opaque, soft, not very brittle, easily frangible, and heavy. This mineral is rare, and seems to be confined to a few places in Saxony and Bohemia. See BISMUTUM.

TENTH GENUS. *Zinc.*

First species. Blende.

Yellow blende is of a dark wax and sulphur yellow colour; it usually occurs massive and disseminated, but is sometimes crystallized in rectangular four-sided prisms; it is shining and splendent both externally and internally, with an adamantine lustre; is found in large and coarse granular distinct concretions, is usually translucent, semihard, brittle, easily frangible, and heavy. It phosphoresces when rubbed in the dark; occurs

most frequently in transitive mountains in Bohemia, and other parts of Germany.

Second species. Calamine.

The general colour. is yellowish-grey, which passes into other neighbouring shades: it occurs massive, disseminated, cellular, corroded, &c. and crystallized in tables, cubes, pyramids, and prisms. Externally the crystals are splendent and shining; internally, between shining and glimmering. It is usually found in small and fine granular distinct concretions, is semihard, not very brittle, rather difficultly frangible, and heavy; and is produced in beds in a floetz limestone formation, accompanied with iron-ochre, lead-glance, &c. It is met with in all the mine counties of England and Scotland, in Germany, and other parts of the continent; and when purified and roasted, is used for the fabrication of brass, which is a compound of zinc and copper. See ZINCUM.

ELEVENTH GENUS. *Antimony.*

First species. Native antimony.

The colour is perfect tin-white: it occurs massive, disseminated, reniform, and probably crystallized; in the fresh fracture it is splendent, and has a metallic lustre. It is found usually in coarse, small, and fine granular distinct concretions, is soft, sectile, easily frangible, and heavy in a low degree. It is produced in veins in Dauphiny and in the Harz, and disseminated in calx-par in Westermanriland, in Sweden; but is a rare mineral.

Second species. Grey antimony ore.

Compact grey antimony-ore is usually of a light lead-grey colour, occurs massive, disseminated, and occasionally in membranes; internally is shining and glistening with a metallicl ustre, is soft, not very heavy, easily frangible, soils, and becomes more shining in the streak. It is found in Sweden and some other countries, but is the rarest sub-species.

Third species. Black antimony ore

Is of an iron-black colour, occurs only crystallized in rectangular four-sided tables, is internally shining with a metallic lustre; is soft, rather sectile, and heavy. In Cornwall it is found of peculiar beauty.

Fourth species. Red antimony ore.

Its colour is cherry-red; it occurs massive, often in membranes, but most frequently in delicate capillary crystals; both externally and internally it is shining, and has an adamantine lustre. It is found in coarse, small, and longish granular distinct concretions, is opaque, not very brittle, and easily frangible; but is a very rare species.

Fifth species. White antimony ore.

It passes in colour from snow-white to several neighbouring shades; occurs massive and in membranes occasionally, but most commonly crystallized in rectangular four-sided tables, cubes, and acicular and capillary crystals. It is found in coarse and small granular distinct concretions, is translucent, soft, rather sectile and heavy. Before the blowpipe, it becomes wholly volatilized. It is found in veins in Bohemia, Hungary, and Saxony.

Sixth species. Antimony-ochre.

The colour is a straw-yellow, of various degrees of intensity; it seldom occurs massive and disseminated, but usually as a coating on crystals of grey antimony ore. It is dull, soft, not very brittle, nor particularly heavy. It is found always in veins, in different parts of Germany, and is evidently found by the decomposition of grey antimony ore. See STIBIUM.

TWELFTH GENUS. *Cobalt.*

First species. White cobalt ore.

When fresh fractured the colour is usually tin-white; it occurs massive, disseminated, &c. and also crystallized in cubes and double four-sided pyramids. It is found in coarse, small, and fine granular distinct concretions; is semihard, brittle, not very difficultly frangible, and heavy. It easily melts before the blowpipe, emits a strong arsenical smell, and yields a white metallic globule. It usually occurs in beds in primitive mountains, and is found in Sweden, Norway, and Silesia.

Second species. Grey cobalt ore.

On the fresh fracture its colour is light steel-grey inclining to white, but it becomes tarnished by exposure; it occurs only massive, disseminated, tubiform and specular; internally it is glimmering or glistening with a metallic lustre, is found in thick and curved lamellar distinct concretions, and is produced in Cornwall, Norway, and various other countries.

Third species. Cobalt glance.

The colour is a silver-white, slightly inclining to reddish: it is commonly massive and disseminated, sometimes crystallized in different forms; is externally splendent, internally between shining and glistening, and has a metallic lustre. It is semihard, brittle, and not very easily frangible; and when struck with steel, emits an arsenical smell. It is found in veins in various formations, in the different mine countries of the continent of Europe; and from it the greatest part of the cobalt in commerce is obtained, which is highly useful in the manufacture of glass, and as a paint.

Fourth species. Black cobalt ore.

Earthy black cobalt ore is of an intermediate colour between brownish and blueish-black, is composed of dull, dusky particles, which soil a little, usually cohering, streak shining, and very light.

Fifth species. Brown cobalt ochre

Is of a liver-brown colour, passing sometimes into other neighbouring shades; it occurs massive and disseminated, is internally dull, soft, sectile, easily frangible, and light; and appears to be peculiar to the floetz mountains in some parts of Germany and Spain.

Sixth species. Yellow cobalt ochre

Is usually of a dirty straw-yellow, occurs massive, frequently much bursted and corroded; it is internally dull, streak shining, soft, and rather friable, sectile, easily frangible, and light. It is the rarest species of cobalt ore, but most valued on account of its purity.

Seventh species. Red cobalt ochre.

Cobalt crust is of a peach blossom-red colour, of

different degrees of intensity, occurs most frequently in velvety drusy coatings, and disseminated, is feebly glimmering, bordering on dull, scarcely soils, has a shining streak, and is very soft and light. See COBALTUM.

THIRTEENTH GENUS. *Nickel.*

First species. Copper nickel

Is of a red copper-colour of different degrees of intensity; it occurs usually massive and disseminated, is internally glistening, and has a metallic lustre. It is usually unseparated; sometimes, however, it is found in coarse and small granular distinct concretions, is semihard, in a high degree brittle, not very easily frangible, and heavy. Before the blowpipe it emits an arsenical smell and odour, and afterwards melts, though with difficulty. It is found in Cornwall, Norway, and many other countries, and is nearly allied to cobalt.

Second species. Nickel ochre

Is of an apple-green colour, occurs always as a coating or efflorescence, is composed of dull dusty particles, loose, or little cohering, feels meagre, and is light. It is found in the same situations with the preceding species. It is not certain that native nickel has yet been discovered, though it is mentioned by some mineralogists. See NICCOLUM.

FOURTEENTH GENUS. *Manganese.*

First species. Grey manganese ore.

Radiated grey manganese ore is of a dark steel-grey colour, occurs massive, disseminated, and crystallized in prisms of different varieties. It is found in coarse, large, and small granular distinct concretions; soils strongly when rubbed, is soft, brittle, rather difficultly frangible, and not particularly heavy. It is produced in several counties of England and Scotland, and in different parts of Germany.

Second species. Black manganese ore

Is of an intermediate colour between brownish-black and dark-greyish black, occurs massive, disseminated, and in octahedral crystals. It is found in small and fine granular concretions; is opaque, semihard, brittle, and heavy; but is a rare mineral, and hitherto found only in a few places of Germany and Spain.

Third species. Red manganese ore

Is of a light rose-red colour, occurs massive and disseminated, is internally dull, translucent in a slight degree, hard, brittle, easily frangible, and heavy. It is found in veins in Norway, France, and some other countries. See MAGNESIUM.

FIFTEENTH GENUS. *Molybdena.*

First species. Molybdena.

Its colour is a fresh burning lead-grey; it occurs usually massive and disseminated, but also crystallized in six-sided tables, and short six-sided prisms; internally it is splendent, the fracture perfectly foliated, and is found in large and coarse granular distinct concretions. It soils a little, is very soft, easily frangible, its thin leaves common flexible, sectile, feels greasy, and is heavy. It is one of the oldest of metals, and occurs only in primitive mountains, disseminated, or in veins; and is produced in Norway, Sweden, Bohemia, and other countries. See MOLYBDENUM.

SIXTEENTH GENUS. *Arsenic.*

First species. Native arsenic.

When fresh broken it is of a light whitish lead-grey colour, but it speedily tarnishes; it occurs massive, disseminated, reniform, and in plates, with various impressions. It is found in thin, curved, lamellar, distinct concretions; in the streak it becomes shining and metallic, semihard in a high degree, very easily frangible, and between sectile and malleable. It occurs only in primitive mountains, and in veins of a newer formation, and is found in various parts of Germany, in France, and in Chili.

Second species. Arsenic pyrites.

Common arsenic pyrites is, when fresh, of a silver-white colour, but soon acquires a yellowish tarnish; it occurs massive, disseminated, and also in crystals of various figures. Internally, it is shining, with a metallic lustre; and is found usually unseparated, is hard, brittle, not easily frangible, and heavy. It occurs only in primitive mountains and in beds, and is produced in Norway, Germany, and Siberia. From this ore the white oxide of arsenic is principally obtained.

Third species. Orpiment.

Red orpiment is of an aurora-colour, of different degrees of intensity: it occurs massive, disseminated in membranes, and also crystallized in oblique four-sided and six-sided prisms. It is translucent, but the crystals are transparent, is very soft, yields a lemon or orange-coloured streak, and is easily frangible. It is found both in primitive and floetz mountains, and is produced in Germany, France, Italy, and the West Indies. It is used as a pigment.

Yellow orpiment is of a perfect lemon-yellow colour, occurs massive, and in very minute crystals, is found in large, coarse, and small angular granulated distinct concretions, is translucent, very soft, sectile, and common flexible. It occurs principally in floetz mountains, in several parts of Germany and the East.

Fourth species. Arsenic bloom.

The colour is a reddish-white and snow-white; it occurs as a coating, in small balls, &c. and in very delicate capillary shining crystals, is translucent on the edges, very soft, easily frangible, and soils. It is produced in rents of a granite rock, and hitherto has only been discovered in Swabia. See ARSENICUM.

SEVENTEENTH GENUS. *Scheele.* *

First species. Tungsten.

The colour is usually yellowish and greyish-white, which pass into several other neighbouring shades; it occurs massive, disseminated, and frequently crystallized. Internally it is shining, with a vitreous lustre; is more or less translucent, soft, not very brittle, and uncommonly heavy. It is found in primitive mountains, and belongs to the oldest metalliferous formations, and is produced in Cornwall, Sweden, Saxony, and Bohemia. See TUNGSTENUM.

Second species. Wolfram

Is of an intermediate colour between dark greyish-black, and brownish black; it occurs

* So called in honour of the illustrious Scheele.

massive, and also crystallized in broad six-sided prisms, and rectangular four-sided tables; and is found in fortification-wise curved lamellar distinct concretions. It is opaque, yields a reddish-brown streak, is soft, brittle, and uncommonly heavy. It is produced in the primitive mountains, almost always accompanied with tin, in Cornwall, and some other countries. See TUNGSTENUM.

EIGHTEENTH GENUS. *Menachine.*

First species. Menachanite

Is of a greyish black colour, inclining to iron-black, occurs only in small flattish angular grains. Internally is glistening, with an adamantine lustre, is perfectly opaque, soft, brittle, retains its colour in the streak, is easily frangible, and moderately heavy. It is attractable by the magnet, and is found in Cornwall, accompanied by fine quartz-sand, in the isle of Providence in America, and at Botany Bay.

Second species. Octrahedrite.

Its colour passes from indigo-blue to many other shades; it occurs only crystallized, and that in very acute octahedrons. It is chiefly translucent, and semitransparent, semihard, brittle, and borders on heavy. It is found in Dauphiny, and appears from accurate experiments to be an oxide of menachine mixed with silica.

Third species. Rutile

Is of a dark blood-red colour, of various degrees of intensity; it occurs always crystallized in four-sided and six-sided prisms, and also in compressed acicular and capillary crystals. Externally it is shining, internally splendent, translucent in a slight degree, hardish, easily frangible, and not very heavy. It is found imbedded in drusy cavities of granite, &c. in different parts of Germany, France, Spain, Siberia, and South Carolina.

Fourth species. Nigrine

Is of a dark brownish-black colour, passing to velvet-black; it occurs in larger and smaller angular grains, and in rolled pieces. Externally moderately glittering, internally the same, with an adamantine lustre, is opaque, semihard, brittle, and yields a yellowish-brown streak. It is found in alluvial hills in several parts of Germany, and also in Ceylon.

Fifth species. Iserine

Is of an iron-black colour, somewhat inclining to brownish-black; it occurs usually in small obtuse angular grains, and in rolled pieces, internally glistening, with a semimetallic lustre, is completely opaque, hard, brittle, and retains its colour in the streak. Hitherto it has been found only in the stream called Iser in Germany, from which it receives its appellation. It bears a great resemblance to iron-sand. See TITANIUM.

NINETEENTH GENUS. *Uran.*

First species. Pitch ore

Is usually of a velvet-black colour; it occurs almost always massive and disseminated. Internally is shining, soft, brittle, uncommonly heavy, and completely infusible without addition. It is found in veins of primitive mountains along with lead and silver ores, and is produced in Saxony and Norway.

Second species. Uran mica.

The principal colour is a grass-green, passing into various allied shades; it occurs sometimes in membranes, but commonly crystallized in rectangular four-sided tables. The fracture is foliated, the fragments and distinct concretions are too minute to be determined. It is more or less translucent, soft, sectile, easily frangible, and is found in iron-stone veins in Cornwall, Saxony, and France.

Third species. Uran ochre.

Friable uran ochre is usually of a straw-yellow colour: it generally occurs as a coating or efflorescence on pitch ore; is friable, and composed of dull dusty particles, which feel meagre, and are not particularly heavy.

Indurated uran ore is of the same colour as the preceding: occurs massive and disseminated, is generally dull, internally opaque, soft, brittle, and soils a little, and is found along with the other ores of uran. See URANIUM.

TWENTIETH GENUS. *Sylvan.*

First species. Native sylvan

Is of an intermediate colour between white and silver-white: occurs massive and disseminated, and also crystallized in four and six-sided prisms, in small three-sided pyramids, in cubes, and in short acicular crystals. It is soft, not very brittle, easily frangible, and heavy; and before the blow-pipe melts as easily as lead, burning with a light green colour, and emitting a sharp, disagreeable odour. Hitherto it has only been found at Facebay, in Transylvania.

Second species. Graphic ore.

Its colour is a light steel-grey: it occurs massive and crystallized; externally is splendent, internally glistening. When massive, it shews a tendency to fine granular distinct concretions: it is soft, brittle, sectile, and heavy, and is worked as an ore of gold in Transylvania, where alone it has yet been found.

Third species. Yellow sylvan ore

Is of a silver-white colour, inclining to brass-yellow: it occurs disseminated and crystallized in very small and rather broad four-sided prisms; is soft, rather sectile, and uncommonly heavy. It is found along with the other species of the genus, and contains a considerable portion both of gold and silver.

Fourth species. Black sylvan ore

Is of an intermediate colour between iron-black and blackish lead-grey: it occurs massive, and in small, thin, and longish six-sided tables, which are usually imbedded. Externally it is splendent; internally shining, soils a little, is very soft, sectile, splits easily, and in thin leaves is common flexible. It melts easily before the blowpipe; occurs in veins along with other minerals, but is only found in Transylvania, where it is worked for the gold and silver it contains. See TELLURIUM.

TWENTY-FIRST GENUS. *Chrome.*

First species. Acicular, or needle ore.

Its colour is dark steel-grey: occurs in imbedded acicular crystals: internally shines with a metallic lustre, is soft, not very brittle, heavy;

and is always accompanied with chrome ochre, and sometimes with native gold. It is found in Siberia.

Second species. Chrome ochre

Is of a verdigris green, passing through several neighbouring shades: it occurs massive, disseminated, and in membranes; is dull, soft, not very heavy, and is found with the preceding species. See CHROMIUM.

Having already extended this article to a greater length than was intended, in order that we might be able to give a satisfactory view of the beautiful system of Werner, we shall only subjoin the names of some other minerals, which either have not been regularly classed, or are but recently discovered, and therefore have not been accurately investigated: these are

Earthy fossils, foliated prehnite, schmelzstein, spodumene, meionite, somnite, glassy felspar, spinthere, metallic fossils, pitchy iron ore, gadolinite, copper-sand or muriat of copper, phosphat of copper, corneous lead ore, reniform lead ore, bournonite, columbite, tantalite, yttertantalite. Of these however several will be found noticed in their alphabetical arrangement.

To which may be added loisite, needle or acicular-stone, fish eye-stone, iron-clay, figure-stone, granular actynolite, dolomite, foliated celestine and its varieties, silver black with its sub-species.

For the various figures assumed by mineral substances on crystallizing, see the article CRYSTALLOGRAPHY, and Plate 107, subjoined to that article.

MINERVA, the goddess of wisdom, war, and all the liberal arts, was produced from Jupiter's brains without a mother. The god married Metis, whose superior prudence made him apprehend that the children of such an union would be more intelligent than their father. To prevent this, Jupiter devoured Metis in her pregnancy, and, some time after, to relieve the pains which he suffered in his head, he ordered Vulcan to cleave it open. Minerva came all armed and grown up from her father's brain, and immediately was admitted into the assembly of the gods. The power of Minerva was great in heaven, and she was the only one of all the divinities whose authority and consequence were equal to those of Jupiter. The actions of Minerva are numerous. Her quarrel with Neptune concerning the right of giving a name to the capital of Cecropia deserves attention. The assembly of the gods settled the dispute by promising the preference to whomsoever of the two gave the most useful present to the inhabitants of the earth. Neptune, upon this, struck the ground with his trident, and immediately a horse issued from the earth. Minerva produced the olive, and obtained the victory by the unanimous voice of the gods, who observed, that the olive, which is the emblem of peace, is far preferable to the horse, which is the symbol of war. The victorious deity called the capital Athenæ, and became the tutelar goddess of the place. Minerva was always very jealous of her power, and the manner in which she punished the presumption of Arachne is well known. (Vide ARACHNE.) The attempts of Vulcan to offer her violence are strong marks of her virtue. (Vide ERICHTHONIUS.) She was known among the ancients by many names. She was called Athena, Pallas, (vide PALLAS.) Parthenos, from her remaining in perpetual celibacy. The worship of Minerva was universally established; she had magnificent temples in Egypt, Phœnicia, all parts of Greece, Italy, Gaul, and Sicily. The festivals celebrated in her honour were solemn and magnificent. (Vide PANATHENÆA.) She was invoked by every artist, and particularly such as worked in wool, embroidery, painting, and sculpture. Minerva was represented in different ways, according to the different characters in which she appeared. She usually was represented with a helmet on her head, with a large plume nodding in the air. In one hand she held a spear, and in the other a shield, with the dying head of Medusa upon it. Sometimes this Gorgon's head was on her breast-plate, with living serpents writhing round it, as well as her shield and helmet. When she appeared as the goddess of the liberal arts, she was arrayed in a variegated veil, which the ancients called peplum. She was partial to the olive tree; the owl and the cock were her favourite birds, and the dragon among reptiles was sacred to her.

Cicero, L. 3. de Nat. Deor. speaks of five Minervas: the first, which he says was the mother of Apollo: the second brought forth by the Nile, which the Egyptian Saites worshipped. Plutarch in his treatise of Osiris, says that the image of Minerva or Pallas was in the city of Sai, with this inscription: Εγω ειμι παν το γεγονος, και ον, και εσομενον, και τον εμον πεπλον ουδεις πω θνητος απεκαλυψεν, "I am all that was, is, and is to come; and my veil no mortal hath hitherto uncovered:" the third is she that came out armed from Jupiter's brain: the fourth was the daughter of Jupiter and Corypha, the daughter of Oceanus, who invented chariots with four wheels: the fifth was the daughter of Pallantis, whom she killed because he would have ravished her: this last they made to have wings to her feet, in the same manner as Mercury. Arnobius pursues the same distinction. We may with certainty conclude, that the second of these Minervas is the most ancient of any of them. Plato in his Timæus, speaking of the city of Sai, says, that Minerva was worshipped there, and called by the name of Neith. Syncellus intimates that the name of queen Nitocris, which includes that of Neith, signified as much as victorious Minerva. Plutarch speaks also of the Minerva of Sai, and says that some made no distinction between her and Isis.

The Phœnicians, according to the relation given us by Sanchniatho, had their Minerva also, and they made her to be the daughter of Saturn, and attributed the invention of arts and arms unto her: this is what Eusebius says of her: "Saturnus liberos procreavit, Proserpinam et Minervam; ac prior quidem Virgo diem obiit; Minerva autem Mercurioque auctoribus falcem ex ferro hastamque conflavit." It was from the Egyptians or Phœnicians that the Greeks

borrowed their Minerva, and Cecrops was the first who taught the Athenians to worship Minerva and Jupiter, as Eusebius says. The conveniency of neighbourhood made Minerva pass from Egypt into Lybia before Cecrops went over into Greece. Herodotus assures us the Lybians made her to be the daughter of Neptune, and the lake Triton, though afterwards upon the account of some misunderstanding between her and her father, she went to Jupiter, who adopted her for his daughter. Pausanias assures us the Athenians were much devoted to the worship of the Gods, and that they were the first who gave Minerva the name of εργανη, *operaria, machinatrix*. He says elsewhere, they built a temple to Minerva, Μαχανιτις, *machinatrix*, as being the goddess that had introduced arts and inventions into the world: he speaks moreover of a statue of Minerva that fell from heaven. He says Minerva aided Perseus in his conflict against Gorgon, near the lake Triton, for which reason that country was consecrated to her. Lastly, the said author declares, the Bœotians affected to give the name of Triton to a brook that run near Minerva's temple, from which she had been named Tritonia. As for Minerva, says St. Augustine, L. 18. C. 9. de Civ. Dei, "She is much more ancient than Mars or Hercules, and they said she lived in the days of Ogyges, near unto the lake Triton, from whence she was named Tritonia: she was the inventress of many rare and useful things; and men were so much the more inclined to believe she was a goddess because her original was not known; for as to the story of her coming full armed from the head of Jupiter, that is manifestly a fable of the poets."

MINERVALIA, festivals at Rome in honour of Minerva, celebrated in the months of March and June. During the solemnity scholars obtained some relaxation from their studious pursuits, and the present, which it was usual for them to offer to their masters, was called Minerval, in honour of the goddess Minerva, who patronized literature.

MINFELD, a town of Germany, in the duchy of Deux Ponts, eight miles S. of Landau.

To MI'NGLE. *v. a.* 1. To mix; to join; to compound; to unite with something so as to make one mass (*Rogers*). 2. To contaminate; to make of dissimilar parts (*Rogers*). 3. To confuse (*Milton*).

To MI'NGLE. *v. n.* To be mixed; to be united with (*Rowe*).

MI'NGLE. *s.* (from the verb.) Mixture; medley; confused mass (*Dryden*).

MI'NGLER. *s.* He who mingles.

MINGRELIA, a province of Asia, which makes parts of Georgia; bounded on the W. by the Black Sea, on the E. by Imeritia, on the S. by a part of Georgia, and on the N. by Circassia. It is governed by a prince, who is tributary to the sovereign of Imeritia. The face of this country, its products, and the customs and manners of the inhabitants, are similar to those of Georgia.

MINIATO, St. an episcopal town of Tuscany, seated on the Arno, 20 miles SW. of Florence. Lon. 10. 45 E. Lat. 43. 40 N.

MINIATURE, or MIGNATURE, a delicate kind of painting, consisting of little points or dots, instead of lines; usually done on vellum, ivory, or paper, with very thin, simple water-colours.

The word comes from the Latin *minium*, red lead; that being a colour much used in this kind of painting. The French frequently call it *mignature*, from *mignon*, fine, pretty, on account of its smallness and delicacy: and it may be ultimately derived from μικρος, small.

Miniature is distinguished from other kinds of painting by the smallness and delicacy of its figures, the weakness of their colours, and faintness of the colouring; and on this account it requires to be viewed very near.

Those colours that have the least body are the best and most commodious for painting in miniature; such are carmine, ultramarine, fine lakes, and green made of the juices of several kinds of herbs and flowers.

The colours commonly used in miniature painting are for red, carmine, lake, rose-pink, vermilion, red lead, scarlet-oker, common Indian red, red oker, Venetian red, and Spanish brown; for blue, ultramarine, ultramarine ashes, Prussian blue, verditer, indigo, smalt, blue bice, and litmus: for yellow, gamboge, Naples yellow, Dutch pink, English pink, gallstone, masticot, French berry wash, turmeric wash, zedoary wash, and tincture of saffron: for green, sap-green, verdigrise, distilled verdigrise, and terra verte: for purple, true Indian red, archal, and logwood wash: for brown, bistre, umbre, brown oker, Cologn earth, and terra japonica: for white, flake white, white lead, calcined hartshorn, pearl white, Troy white, lake white, and egg-shell white: and for black, Indian ink, lamp black, ivory black, and blue black.

Painting in miniature is the nicest and most tedious of all others; being performed wholly with the point of the pencil.

There are some painters who never use any white colour in miniature, but make the ground of the vellum serve to raise their figures; in which case, the lights appear bright in proportion to the depth and strength of the colours of the figures. Others before they go to work, give the vellum a light wash with white lead, well prepared and purified.

When paper of any proper kind is used, it is sufficient to prime it with isinglass size, thickened properly with pearl white, and any pigment which will give the ground the desired colour. But common paper may be rendered stronger and fitter for receiving the colours, by laying on the back of it a coat of starch, boiled with water to a moderate consistence, and rendered more tenacious by the addition of a little isinglass. This should be laid on very smoothly with a brush, and the paper, when nearly dry, must be put betwixt two leaves of a book, or betwixt two sheets of paper and two boards, and compressed by a weight laid upon them. Two sheets of paper cemented together by the

starch and isinglass, and treated in the same manner, make a very commodious substance for painting in miniature. Vellum requires only to be strained on a pasteboard, and primed in the same manner; and if it should be greasy, rubbed over with the gall of any beast.

When the colours are laid on flat without dotting, though the figures be small, and the ground either vellum or paper, it is not called miniature, but washing.

The colours for miniature may be mixed up with a solution of gum arabic, or gum tragacanth, in water, or with isinglass size.

MI'NIKIN. *a.* Small; diminutive (*Shaks.*).

M'INIKIN. *s.* A small sort of pins.

MI'NIM. *s.* (from *minimus*, Latin.) A small being; a dwarf (*Milton*).

MINIM, in music, a note, or character of time; equal to two crotchets, or half a semibreve.

The invention of the minim is ascribed to a certain priest in Navarre, but the first who used it was Philip de Vitriaco, in whose time it was the smallest note in practice. See TIME, CHARACTERS, and MUSIC.

MINIMA NATURÆ, or MINIMA NATURALIA, among philosophers, the primary articles, whereof bodies consist; the same with what are otherwise called corpuscles, and atoms.

MINIMA, in the higher geometry, the smallest quantities attainable in any given case. See MAXIMUM.

MI'NIMUS. *s.* (Latin.) A being of the least size (*Shakspeare*).

MI'NION. *s.* (*mignon*, French.) A favourite; a darling; a low dependant (*Swift*).

MI'NIOUS. *a.* (from *minium*, Latin.) Of the colour of red lead or vermilion (*Brown*).

To MI'NISH. *v. a.* (from *diminish*: *minus*, Lat.) To lessen; to lop; to impair (*Psalms*).

MI'NISTER. *s.* (*minister*, Latin.) 1. An agent; one who is employed to any end; one who acts under another (*Sidney*). 2. One who is employed in the administration of government (*Bacon*). 3. One who serves at the altar; one who performs sacerdotal functions (*Addison*). 4. A delegate; an official (*Shaks.*). 5. An agent from a foreign power.

MINISTER OF STATE, a person to whom the prince intrusts the administration of government. See COUNCIL.

MINISTER (Foreign), is a person sent into a foreign country, to manage the affairs of his province, or of the state to which he belongs. Of these there are two kinds: those of the first rank are embassadors and envoys extraordinary, who represent the persons of their sovereigns; the ministers of the second rank are the ordinary residents.

To MI'NISTER. *v. a.* (*ministro*, Latin.) To give; to supply; to afford (*Otway*).

To MI'NISTER. *v. n.* 1. To attend; to serve in any office (*Milton*). 2. To give medicines (*Shakspeare*). 3. To give supplies of things needful; to give assistance; to contribute; to afford (*Smalr.*). 4. To attend on the service of God (*Romans*).

MINISTE'RIAL. *a.* (from *minister.*) 1. Attendant; acting at command (*Brown*). 2. Acting under superior authority (*Rogers*). 3. Sacerdotal; belonging to the ecclesiastics or their office (*Hooker*). 4. Pertaining to ministers of state.

MINISTE'RIALLY. *ad.* In a ministerial manner (*Waterland*).

MI'NISTERY. *s.* (*ministerium*, Latin.) Office; service: commonly *ministry* (*Digby*).

MI'NISTRAL. *a.* (from *minister.*) Pertaining to a minister.

MI'NISTRANT. *a.* (from *minister.*) Attendant; acting at command (*Milton*).

MI'NISTRA'TION. *s.* (from *ministro*, Lat.) 1. Agency; intervention; office of an agent delegated or commissioned by another (*Taylor*). 2. Service; office; ecclesiastical function.

MI'NISTRY. *s.* (contracted from *ministery.*) 1. Office; service (*Sprat*). 2. Office of one set apart to preach; ecclesiastical function (*Locke*). 3. Agency; interposition (*Bentley*). 4. Business (*Dryden*). 5. Persons employed in public affairs of state (*Swift*).

MINIUM, in the arts, red lead, and oxide of lead. See LEAD.

MINNIN, a stringed instrument of music among the ancient Hebrews, having three or four chords to it; though there is reason to question the antiquity of this instrument; both because it requires a hair-bow, which was a kind of plectrum not known to the ancients, and because it so much resembles the modern viol. Kircher took the figures of this, the machul, chinnor, and psaltry, from an old book in the Vatican library.

MINO, a river of Spain, which rises in Galicia, near Castro del Rey, and passing by Lugo, Ortense, and Tey, it then divides Galicia from Portugal, and falls into the Atlantic Ocean at Caminha.

MI'NOR. *a.* (Latin.) 1. Petty; inconsiderable (*Brown*). 2. Less; smaller (*Clarendon*).

MINOR, a Latin term, literally denoting less; used in opposition to major, greater.

MINOR, in law, denotes a person under age; or who, by the laws of the country, is not yet arrived at the power of administering his own affairs, or the possession of his estate. Among us, a person is a minor till the age of twenty-one: before which time his acts are invalid. (See AGE and INFANT.) It is a maxim in the common law, that in the king there is no minority, and therefore he hath no legal guardian; and his royal grants and assents to acts of parliament are good, though he has not in his natural capacity attained the legal age of twenty-one. It is also provided by the custom and law of parliament, that no one shall sit or vote in either house, unless he be twenty-one years of age. This is likewise expressly declared by stat. 7 and 8 Will. III. cap. 25. with regard to the house of commons.

MINOR, in logic, is the second proposition of a formal or regular syllogism, called also the assumption.

MINOR, in music, is applied to certain concords, which differ from or are lower than others of the same denomination by a lesser semitone or four commas. Thus we say, a third minor, or lesser third, or a sixth major and minor. Concords that admit of major and minor, i. e. greater and less, are said to be imperfect concords.

To MI'NORATE. *v. a.* (from *minor*, Lat.) To lessen; to diminish (*Glanville*).

MINORA'TION. *s.* (from *minorate.*) The act of lessening; diminution; decrease (*Brown*).

MINORBINO, a town of Naples, in Terra di Bari, with a bishop's see, twenty-six miles N. of Cirenza. Lon. 16. 19 S. Lat. 41. 8 N.

MINORCA, an island of the Mediterranean, lying fifty miles to the N.E. of Majorca. It is thirty miles long and twelve broad; and is a mountainous country, with some fruitful valleys, where there are excellent mules. Cittadella is the capital; but the town of Mahon claims greater consequence, on account of its excellent harbour, called Port Mahon, which is defended by Fort St. Philip, one of the strongest fortresses in Europe, and on the fate of which the whole island depends. Minorca was taken by the English in 1708, and confirmed to them by the treaty of Utrecht. The French took it in 1756; but it was restored in 1763. It was retaken by the Spaniards in 1782, and confirmed to them by the peace of 1783. It was again taken by the English, without the loss of a man, in 1798. Port Mahon lies in Lon. 3. 48 E. Lat. 39. 50 N.

MINORI, a town of Naples, in Principato Citeriore, with a bishop's see. It is seated on the gulf of Salerno, between the town of that name and Amalfi.

MINO'RITY. *s.* (from *minor*, Latin.) 1. The state of being under age (*Shakspeare.*) 2. The state of being less (*Brown*). 3. The smaller number.

MINOS, a king of Crete, son of Jupiter and Europa, who gave laws to his subjects, B.C. 1406, which still remained in full force in the age of the philosopher Plato. His justice and moderation procured him the appellation of the favourite of the gods, and the wise legislator, and, according to the poets, he was rewarded for his equity, after death, with the office of supreme judge in the infernal regions. In this capacity he is represented sitting in the middle of the shades, and holding a sceptre in his hand. The dead plead their different causes before him, and the impartial judge shakes the fatal urn, which is filled with the destinies of mankind. The second was a son of Lycastes, the son of Minos I. and king of Crete. He married Pasiphae, the daughter of Sol and Perseis, and by her he had many children. He showed himself cruel in the war which he carried on against the Athenians, who had put to death his son Androgeus. (See ANDROGEUS.) He took Megara by the treachery of Scylla, (vide SCYLLA); and not satisfied with a victory, he obliged the vanquished to bring him yearly to Crete seven chosen boys, and the same number of virgins, to be devoured by the Minotaur. (Vide MINOTAURUS.) This bloody tribute was at last abolished when Theseus had destroyed the monster. (Vide THESEUS.) He was at last put to death by Cocalus king of Sicily, who had given an asylum to Dædalus, (vide DÆDALUS) whom he pursued from Crete for ministering to the unnatural desires of Pasiphae.

MINOTAURUS, a celebrated monster, half a man and half a bull, according to Ovid. It was the fruit of Pasiphae's amour with a bull. Minos refused to sacrifice a white bull to Neptune, an animal which he had received from the god for that purpose. This offended Neptune, and he made Pasiphae, the wife of Minos, enamoured of this bull. Dædalus prostituted his talents in being subservient to the queen's unnatural desires, and, by his means, Pasiphae's horrible passions were gratified, and the Minotaur came into the world. Minos confined in the labyrinth a monster which shewed his wife's indecency. The Minotaur was at length killed by Theseus, who was one of the tributary Athenian youths to be devoured by it. Theseus received, it is said, a clue from Ariadne, which served to extricate him from the mazes of the labyrinth, and to effect his escape after he slew the Minotaur. The tradition of the Minotaur, and of the commerce of Pasiphae with a bull, is explained by making her enamoured of one of her husband's courtiers, called Taurus, whom she met at the house of Dædalus, and also by supposing her to bring forth twins, one resembling Minos, the other Taurus.

MINOW, in ichthyology. See CYPRINUS.

MINSFELDEN, or MENSFELDEN, a town of Germany, in the archbishopric of Treves, 25 miles E. of Coblentz. Lon. 7. 57 E. Lat. 50. 26 N.

MINSINGEN, a town of Suabia, in the duchy of Wirtemberg, with a castle. Lon. 9. 35 E. Lat. 48. 32 N.

MINSKI, a town of Lithuania, capital of a palatinate of the same name, with two citadels. The country is pretty fertile, and has forests containing vast numbers of bees, whose honey makes part of its riches. Minski is 65 miles N. of Sluczk, and 100 S.E. of Wilna. Lon. 26. 48 E. Lat. 54. 11 N.

MI'NSTER. *s.* (mynꝼꞇeꞃ, Saxon.) A monastery; an ecclesiastical fraternity; a cathedral church.

MINSTREL, in ancient customs, certain persons who combined the character of poet and musician, and whose profession it was to wander about the countries they inhabited, singing panegyrical songs and verses on their occasional benefactors, accompanying them with some musical instrument.

Borel derives the word from *manus* and *histrio*, one who diverts with the hand; or from *minor histrio*, little buffoon: Du Cange from *ministellus*, a diminutive of minister, because the minstrels were anciently ranked among the lower officers, ministers, or servants.

According to Dr. Percy in his Essay on the Ancient English Minstrels, the word is derived from the French *menestrier*; and was not in use here before the Norman conquest: and it

is remarkable, that our old monkish historians do not use the word *citharoedus*, *cantator*, or the like, to express a minstrel in Latin; but either *mimus*, *histrio*, *joculator*, or some other word that implies gesture. Hence it should seem that the minstrels set off their singing by mimickry or action; or, according to Dr. Brown's hypothesis, united the powers of melody, poem, and dance. These minstrels were probably the genuine successors of the ancient bards, who joined the arts of poetry and music, and sung verses to the harp of their own composing. After the conversion of the Saxons to Christianity, the poets and minstrels became two separate professions: and the latter continued to be a distinct order of men, and got their livelihood by singing verses to the harp at the houses of the great: where they were hospitably and respectfully received, retaining many of the honours shewn to their predecessors the bards and scalds. And though some of them only recited the compositions of others, many of them still composed songs themselves, and all of them could probably invent a few stanzas on occasion. There are two remarkable facts in history, which prove that the profession of a minstrel was held in great reverence among the Saxon tribes, as well as among their Danish brethren. In the year 878, when king Alfred wished to learn the true situation of the Danish army, which had invaded his realm, he assumed the dress and character of a minstrel, *fingens se joculatorem, assumpta cithara*, &c. and under this character, though he could not be known to be a Saxon, obtained an honourable reception. About sixty years after a Danish king made use of the same disguise to explore the camp of our king Athelstan. The minstrel was, therefore, a privileged character with both these people: and so late as the reign of Edward II. the minstrels were easily admitted into the royal presence; an instance of which is mentioned by Stow, Survey of London, 1703, p. 469. In the fourth year of Richard II. John of Gaunt erected at Tutbury, in Staffordshire, a court of minstrels, with full power to receive suit and service from the men of this profession within five neighbouring counties, to enact laws and determine their controversies, &c. for which they had a charter. (See Plott's Hist. Staff. p. 435, &c.) The minstrels continued down to the reign of Elizabeth; in whose time, however, they had lost much of their dignity, and were sinking into contempt and neglect; yet still they sustained a character far superior to any thing we can conceive at present of old ballads. Towards the end of the sixteenth century this class of men lost all credit, and were sunk so low in the public opinion, that in the thirty-ninth year of Elizabeth a statute was passed, by which minstrels, wandering abroad, were included among rogues, vagabonds, and sturdy beggars, and were adjudged to be punished as such. This act seems to have put an end to the profession, for after this time they are no longer mentioned. Judge Blackstone observes, that in some manors the copyholders were bound to perform many servile offices for the lord, who found them meat and drink, and sometimes, (as is still the use in the highlands of Scotland) a minstrel or piper for their diversion. Comm. b. ii. p. 96.

MI'NSTRELSY. *s.* (from *minstrel.*) 1. Music; instrumental harmony. (*Davies*). 2. A number of musicians (*Milton*).

MINT. *s.* (minte, Saxon.) in botany. See MENTHA.

MINT (Cat). See NEPETA.

MINT (Pepper). See MENTHA.

MINT, the place in which the king's money is coined. (See COINAGE.) There were anciently mints in almost every county in England; but the only mint at present in the British dominions is that in the Tower of London. The officers of the mint are, 1. The warden of the mint, who is the chief; he oversees the other officers and receives the bullion. 2. The master-worker, who receives bullion from the warden, causes it to be melted, delivers it to the moneyers, and, when it is coined, receives it again. 3. The comptroller, who is the overseer of all the inferior officers, and sees that all the money is made to the just assize. 4. The assay-master, who weighs the gold and silver, and sees that it is according to the standard. 5. The two auditors, who take the acconnts. 6. The surveyor of the melting; who, after the assay-master has made trial of the bullion, sees that it is cast out, and not altered after it is delivered to the melter. 7. The engraver; who engraves the stamps and dyes for the coinage of the money. 8. The clerk of the irons; who sees that the irons are clean and fit to work with. 9. The melter; who melts the bullion before it be coined. 10. The provost of the mint; who provides for and oversees all the moneyers. 11. The blanchers, who anneal and cleanse the money. 12. The moneyers; some of whom forge the money, some share it, some round and mill it, and some stamp and coin it. 13. The porters, who keep the gate of the mint.

Mint was also a pretended place of privilege, in Southwark, near the King's Bench, put down by statute. If any persons, within the limits of the mint, shall obstruct any officer in the serving of any writ or process, &c. or assault any person therein, so as he receive any bodily hurt, the offender shall be guilty of felony, and be transported to the plantations, &c. Stat. 9. Geo. I.

MINT, is also used figuratively for any place of invention.

To MINT. *v. a.* (from the noun.) 1. To coin; to stamp money (*Bacon*). 2. To invent; to forge (*Bacon*).

MI'NTAGE. *s.* (from *mint*). 1. That which is coined or stamped (*Milton*). 2. The duty paid for coining (*Ainsworth*)

MI'NTER. *s.* (from *mint*) Coiner (*Cam.*).

MINTHE, a daughter of Cocytus, loved by Pluto. Proserpine discovered her husband's amour, and changed his mistress into an herb, called by the same name, *mint*.

MI'NTMAN. *s.* (*mint* and *man.*) One skilled in coinage (*Bacon*).

MI'NTMASTER. *s.* (*mint* and *master.*) 1.

One who presides in coinage (*Boyle*). 2. One who invents (*Locke*).

MINTURNÆ, a town of Campania, between Sinuessa and Formiæ. It was in the marshes of its neighbourhood that Marius concealed himself in the mud, to avoid the partizans of Sylla. (See MARIUS.)

MINUET, (from the French *menu*, little, and signifying a small pace.) A movement of three crotchets or three quavers in a bar; of a slow and graceful motion, and always beginning with the beating note. This is the dancing minuet, and is said to have been invented at Poitou: but there are other minuets of a time somewhat quicker, and which were formerly much used as concluding movements of overtures, sonatas, &c.

MI'NUM. *s.* 1. (With printers.) A small sort of printing letter. 2. (With musicians.) A note of slow time. See MINIM.

MINU'TE. *a.* (*minutus*, Lat.) Small; little; slender; small in bulk (*South*).

MI'NUTE. *s.* (*minutum*, Latin.) 1. The sixtieth part of an hour (*Shakspeare*). 2. Any small space of time (*South*). 3. The first draught of any agreement in writing.

To MINU'TE. *v. a.* (*minuter*, French.) To set down in short hints (*Spectator*).

MINUTE is the 60th part of a degree, or of an hour. The minutes of a degree are marked with the acute accent, thus ′; the seconds by two, ″; the thirds by three, ‴. The minutes, seconds, thirds, &c. in time, are sometimes marked the same way; but, to avoid confusion, the better way is by the initials of the words; as minutes ^{m}, seconds ^{s}, thirds ^{t}, &c.

MINUTE, in architecture, usually denotes the 60th part of a module, but sometimes only the 30th part.

MI'NUTE-BOOK. *s.* (*minute* and *book*.) Book of short hints.

MI'NUTE-GLASS. *s.* (*minute* and *glass*.) Glass of which the sand measures a minute.

MINU'TELY. *ad.* (from *minúte*.) To a small point; exactly (*Locke*).

MI'NUTELY. *ad.* (from *mínute*, the substantive.) Every minute; with very little time intervening (*Hammond*).

MINU'TENESS. *s.* (from *minúte*.) Smallness; exility; inconsiderableness (*Bentley*).

MI'NUTE-WATCH. *s.* (*minute* and *watch*.) A watch in which minutes are more distinctly marked than in common watches which reckon by the hour (*Boyle*).

MINUTIA, a vestal virgin, accused of debauchery on account of the beauty and elegance of her dress. She was condemned to be buried alive because a female supported the false accusation, A. U. C. 418. (*Liv*.).

MINUTIUS, a name common to some eminent Romans, the most remarkable of whom is Rufus, a master of horse to the dictator Fabius Maximus. His disobedience to the commands of the dictator was productive of an extension of his prerogative, and the master of the horse was declared equal in power to the dictator. Minutius, soon after this, fought with ill success against Annibal, and was saved by the interference of Fabius; which circumstance had such an effect upon him that he laid down his power at the feet of his deliverer, and swore that he would never act but by his directions. He was killed at the battle of Cannæ.

MINUTIUS FELIX, was a famous Roman orator. He was an African; when he lived is very uncertain. The earliest date allowed him is 170; the latest 220. Dr. Lardner after Baronius supposes he lived in 210, towards the close of the reign of Septimius Severus. His defence of the christian religion is allowed to be an excellent one. It is in form of a dialogue between Cæcilius Natalis a heathen, and Octavius Januarius a christian; in which Minutius sits judge. Cæcilius first objects, and then Octavius answers. The issue is, the conviction of Cæcilius, and his conversion to christianity. This work of Minutius is a learned, ingenious, and eloquent performance. The editions most prized are that of Leyden in 1652 and 1672, of Leyden by Gronovius in 1709, the Cambridge edition of Dr. Davies, in 1712, the Glasgow edition of 1750, and the Leipsic edition of 1773.

MINX. *s.* A young, pert, wanton girl (*Shakspeare*).

MINYÆ, a name given to the inhabitants of Orchomenos, in Bœotia, from Minyas, a king of the country. Orchomenos, the son of Minyas, gave his name to the capital of the country, and the inhabitants still retained their original appellation in contradiction to the Orchomenians of Arcadia.

MINYAS, a king of Bœotia, son of Neptune and Tritegenia, the daughter of Æolus. He married Clytodora, by whom he had Presbon, Periclymenus, and Eteoclymenus. He was father of Orchomenos, Diochithondes, and Athamas, by a second marriage, with Phanasora, the daughter of Paon. According to Plutarch and Ovid he had three daughters, called Leuconoe, Alcithoe, and Leucippe. They were changed into bats. See MINEIDES.

MINYCUS, a river of Thessaly, falling into the sea near Arene, called afterwards Orchomenos.

MIOLANS, a fortress of France, in the department of the Lower Alps, seated on a craggy rock, in the valley of Barcelonetta, six miles N.E. of Montmelian. Lon. 6. 20 E. Lat. 45. 35 N.

MIOSS, a lake of Norway, in the province of Hedemarke, 80 miles in circumference. It is divided by a large peninsula, and contains a fertile island 10 miles in circumference.

MIQUELON, a small desert island, S.W. of Cape May in Newfoundland, ceded to the French in 1763, for drying and curing their fish. They were dispossessed of it by the English in 1793. Lon. 66. 10 W. Lat. 46. 42 N.

MIRA, a town of Portugal, in Beira, 16 miles N.W. of Coimbra. Lon. 8. 25 W. Lat. 40. 20 N.

MIRABILE, in mineralogy, a genus of the

class salts. Of a bitter taste; not easily soluble in cold water, and the solution not made turbid by a mixture of soda; not effervescing with any acid; exposed to a white heat with powdered charcoal producing an alkaline sulphur. Four species.

1. M. genuinum. Vitriolated natrum; sulphat of soda; Glauber's salt. Of a cooling taste, easily melting in the fire, when dissolved and slowly evaporated crystallizing into very transparent unequally six-sided prisms, which moulder in the air. Found in many mineral waters of Britain and other parts of Europe, sometimes dry, rarely in a crystallized state, sometimes in a state of white efflorescence on moist walls, in vast quantities under the surface of the earth in the neighbourhood of Astracan, and in summer at the bottom of lakes, seldom found pure, but usually mixed with soda, common salt, Epsom salt, or selenite; the sides of the crystals are commonly grooved; and when exposed to a warm atmosphere they soon lose their transparency and water of crystallization, and fall into a white opake powder; when exposed to heat the salt first melts, and after the evaporation of its water becomes a white powder, which melts in a red heat. Contains,

Acid	27
Soda	15
Water	58
	100

Its use as a cooling purgative is sufficiently known, for which see NATRUM VITRIOLATUM, and SULPHAT OF SODA.

2. M. potassinum. Sal polychrest; vitriolated kali; vitriolated tartar; sulphat of potass, or potash. Of a bitterish taste, decrepitating when placed on hot coals and melting in a read heat, soluble in sixteen times its weight of cold water; its crystals not mouldering in the air. With an excess of acid this salt is denominated supersulphat of potash.

Found in various parts of Spain, of a greyish white colour, and sometimes luminous in the dark; when its diluted solution is evaporated it affords six-sided prisms, or short hexangular prisms terminated by one or more hexangular pyramids; the supersulphat of potash from its excess of acid turns blue vegetable juices red, and is soluble in twice its weight of water. It was formerly used as a purgative under the name of sal polychrest; which has since been changed successively to vitriolated tartar, vitriolated kali, and now under the Lavoisierian nomenclature to sulphat of potash. For its medicinal properties, see KALI VITRIOLATUM. Specific gracity 2,298. It contains,

Acid	40
Potash	52
Water	8
	100

3. M. semivolatile. Of an acrid taste, evaporating in fumes when heated, deliquescing in the air, emitting an alkaline odour when rubbed together with quick-lime. Found rarely in the vicinity of volcanic mountains.

4. M. sulphureum. Vitriolic ammoniac; sulphat of ammonia; sulphuric acid united to ammonia. Evaporating in fumes when heated, deliquescing in the air, when rubbed together with quick-lime emitting an alkaline odour, and when sprinkled with nitric acid an odour like burnt sulphur. Found in the neighbourhood of volcanoes, in some lakes in Tuscany, at the bottom of a burning well in Dauphigny, and on the surface of the earth near Turin. It is generally found mixed with sulphur, alumina, alum, or vitriol, and hence its colour is seldom white, but of a grey, yellowish-grey, or lemon: it is found also in a stalactitical form, or investing lavas, or in an earthy state with little or no lustre: its crystals are generally six-sided prisms whose planes are unequal, terminated by six-sided pyramids: soluble in twice its weight of cold water, and slowly attracts moisture when exposed to the air; when heated it first decrepitates, and then melts, and in close vessels, sublimes. Contains,

Acid	54,66
Ammonia	14,24
Water	31,10
	100,00

MIRABILIS. Marble of Peru. In botany, a genus of the class pentandria, order monogynia. Corol funnel-form, superior; calyx inferior; nectary globular, inclosing the germ. Four species: natives of India and South America; the roots of one of which, M. jalapa, was formerly, but erroneously, supposed to be the officinal jalap, for which see CONVOLVULUS JALAP. The roots, however, of all these species are purgative in some degree, and are occasionally used to produce this effect. The M. jalapa is chiefly cultivated for its flowers, which are very showy and in different varieties of almost every colour.

MIRACLE, in a popular sense, is a prodigy, or an extraordinary event, that surprises us by its novelty.

MIRACLE, in a more accurate and philosophical sense, is an effect that does not follow from any of the regular laws of nature; or which is inconsistent with some known law thereof; or contrary to the settled constitution and course of things: accordingly all miracles presuppose an established system of nature, within the limits of which they operate, and with the order of which they disagree.

Spinoza denies, that any power can supersede that of nature; or that any thing can disturb, or interrupt, the order of things: and accordingly defines a miracle to be a rare event, happening in consequence of some laws that are unknown to us.

Divines define a miracle, an extraordinary and wonderful effect, above the power of nature, wrought by God, to manifest his power or providence; or to give credit to some messenger sent from himself. Thus Jesus Christ evinced the truth of his mission, and his doctrine, by mi-

racles; and thus also did Moses. But there are scarce any theological writers that precisely agree in their definition of a miracle. Mr. Locke defines it to be a sensible operation, which, being above the comprehension of the spectator, is, in his opinion, contrary to the course of nature, and taken by him to be divine. Dr. Clarke's definition of a miracle, in the theological sense of the word, is this: that it is a work effected in a manner unusual, or different from the common and regular method of Providence, by the interposition either of God himself or of some intelligent agent superior to man, for the proof or evidence of some particular doctrine, or in attestation to the authority of some particular person. According to Dr. Sykes, a miracle is a designed effect, sensible, unusual in itself, beyond the art and power of man to do. Dr. Chandler says, that a miracle is an action done, or an operation visibly performed by any being, which is really and truly above the reach, natural power, and capacity of that being who does it, of himself, and without the assistance of some superior agent to perform. With this Dr. Hutcheson's definition nearly coincides, viz. that it is a work far exceeding human power, yet performed by the command, or upon the volition of a man. And the same writer farther observes, that, though miracles may prove the superintendency of a voluntary agent, and that the universe is not guided by necessity or fate; yet that mind must be weak and inadvertent, who needs them to confirm the belief of a wise and good Deity; since the deviation from general laws, unless upon very extraordinary occasions, must be a presumption of inconstancy and weakness rather than of a steady wisdom and power; and must weaken the best arguments we have for the sagacity and power of the universal mind.

That the visible world is governed by stated general rules, or that there is an order of causes and effects established in every part of the system of nature which falls under our observation, is a fact which cannot be controverted. If the Supreme Being, as some have supposed, be the only real agent in the universe, we have the evidence of experience, that, in the particular system to which we belong, he acts by stated rules. If he employs inferior agents to conduct the various motions from which the phenomena result, we have the same evidence that he has subjected those agents to certain fixed laws, commonly called the *laws of nature*. On either hypothesis, effects which are produced by the regular operation of these laws, or which are conformable to the established course of events, are properly called *natural*; and every contradiction to this constitution of the natural system, and the correspondent course of events in it, is called a *miracle*.

If this definition of a miracle be just, no event can be deemed miraculous merely because it is strange, or even to us unaccountable; since it may be nothing more than a regular effect of some unknown law of nature. In this country earthquakes are rare; and for monstrous births perhaps no particular and satisfactory account can be given: yet an earthquake is as regular an effect of the established laws of nature as any of those with which we are most intimately acquainted; and under circumstances in which there would always be the same kind of production, the monster is nature's genuine issue. It is therefore necessary, before we can pronounce any effect to be a true miracle, that the circumstances under which it is produced be known, and that the common course of nature be in some degree understood; for in all those cases in which we are totally ignorant of nature, it is impossible to determine what is, or what is not, a deviation from its course. Miracles, therefore, are not, as some have represented them, appeals to our ignorance. They suppose some antecedent knowledge of the course of nature, without which no proper judgment can be formed concerning them; though with it their reality may be so apparent as to prevent all possibility of a dispute.

Thus, were a physician to cure a blind man of a cataract, by anointing his eyes with a chemical preparation which we had never before seen, and to the nature and effects of which we are absolute strangers, the cure would undoubtedly be wonderful; but we could not pronounce it miraculous, because, for any thing known to us, it might be the natural effect of the operation of the unguent on the eye. But were he to recover his patient merely by commanding him to see, or by anointing his eyes with spittle, we should with the utmost confidence pronounce the cure to be a miracle; because we know perfectly that neither the human voice nor human spittle have, by the established constitution of things, any such power over the diseases of the eye. No one is now ignorant, that persons apparently dead are often restored to their families and friends, by being treated in the manner recommended by the Humane Society. To the vulgar, and sometimes even to men of science, these effects appear very wonderful; but as they are known to be produced by physical agency, they can never be considered as miraculous deviations from the laws of nature. On the other hand, no one could doubt of his having witnessed a real miracle who had seen a person that had been four days dead come alive out of his grave at the call of another, or who had even beheld a person exhibiting all the symptoms of death instantly resuscitated merely by being desired to live.

Thus easy is it, in all cases in which the course of nature is understood, to determine whether any particular event be really a miracle; whilst in circumstances where we know nothing of nature and its course, even a true miracle, were it performed, could not be admitted as such, or carry any conviction to the mind of a philosopher.

If miracles be effects contrary to the established constitution of things, we are certain that they will never be performed on trivial occasions. The constitution of things was established by the Creator and Governor of the universe, and is undoubtedly the offspring of infinite wisdom pursuing a plan for the best of purposes. From this plan no deviation can be made but by God himself, or by some powerful being acting with his permission. The plans devised by wisdom are steady in proportion to their perfection, and the plans of infinite wisdom must be absolutely perfect. From this consideration some men have ventured to conclude, that no miracle was ever wrought, or can rationally be expected; but maturer reflection must soon satisfy us that all such conclusions are hasty.

Man is unquestionably the principal creature in this world, and apparently the only one in it who is capable of being made acquainted with the relation in which he stands to his Creator. We cannot, therefore, doubt, but that such of the laws of nature as extend not their operation beyond the limits of this earth were established chiefly, if not solely, for the good of mankind; and if, in any particular circumstances, that good can be more effectually promoted by an occasional deviation from

those laws, such a deviation may be reasonably expected. Were man, in the exercise of his mental and corporeal powers, subjected to the laws of physical necessity, the circumstances supposed would indeed never occur, and of course no miracle could be admitted. But such is not the nature of man.

The relation between motives and actions is different from that between cause and effect in physics; and mankind have such command over themselves, as that by their voluntary conduct they can make themselves in a great degree either happy or miserable. We know likewise from history, that, by some means or other, almost all mankind were once sunk into the grossest ignorance of the most important truths; that they knew not the Being by whom they were created and supported; that they paid divine adoration to stocks, stones, and the vilest reptiles; and that they were slaves to the most impious, cruel, and degrading superstitions.

From this depraved state it was surely not unworthy of the common "Father of all" to rescue his helpless creatures, to enlighten their understandings that they might perceive what is right, and to present to them motives of sufficient force to engage them in the practice of it. But the understandings of ignorant barbarians cannot be enlightened by arguments; because of the force of such arguments as regard moral science they are not qualified to judge. The philosophers of Athens and Rome inculcated, indeed, many excellent moral precepts, and they sometimes ventured to expose the absurdities of the reigning superstition: but their lectures had no influence upon the multitude; and they had themselves imbibed such erroneous notions respecting the attributes of the Supreme Being and the nature of the human soul, and converted those notions into first principles, of which they would not permit an examination, that even among them a thorough reformation was not to be expected from the powers of reasoning. It is likewise to be observed, that there are many truths of the utmost importance to mankind, which unassisted reason could never have discovered. Amongst these we may confidently reckon the immortality of the soul, the terms upon which God will be reconciled to sinners, and the manner in which that all-perfect Being may be acceptably worshipped; about all of which philosophers were in such uncertainty, that, according to Plato, "Whatever is set right, and as it should be, in the present evil state of the world, can be so only by the particular interposition of God."

An immediate revelation from Heaven, therefore, was the only method by which infinite wisdom and perfect goodness could reform a bewildered and vicious race. But this revelation, at whatever time we suppose it given, must have been made directly either to some chosen individuals commissioned to instruct others, or to every man and woman for whose benefit it was ultimately intended. Were every person instructed in the knowledge of his duty by immediate inspiration, and were the motives to practise it brought home to his mind by God himself, human nature would be wholly changed: men would not be masters of their own actions; they would not be moral agents, nor by consequence be capable either of reward or of punishment. It remains, therefore, that if God has been graciously pleased to enlighten and reform mankind, without destroying that moral nature which is essential to virtue, he can have done it only by revealing his truth to certain chosen instruments, who were the immediate instructors of their contemporaries, and through them have been the instructors of succeeding ages.

Let us suppose this to have been actually the case, and consider how those inspired teachers could communicate to others every truth which had been revealed to themselves. They might easily, if it were part of their duty, deliver a sublime system of natural and moral science, and establish it upon the common basis of experiment and demonstration; but what foundation could they lay for those truths which unassisted reason cannot discover, and which, when they are revealed, appear to have no necessary relation to any thing previously known? To a bare affirmation that they had been immediately received from God, no rational being could be expected to assent. The teachers might be men of known veracity, whose simple assertion would be admitted as sufficient evidence for any fact, in conformity with the laws of nature; but as every man has the evidence of his own consciousness and experience that revelations from heaven are deviations from these laws, an assertion so apparently extravagant would be rejected as false, unless supported by some better proof than the mere affirmation of the teacher. In this state of things, we can conceive no evidence sufficient to make such doctrines be received as the truths of God, but the power of working miracles committed to him who taught them. This would, indeed, be fully adequate to the purpose. For, if there were nothing in the doctrines themselves impious, immoral, or contrary to truths already known, the only thing which could render the teacher's assertion incredible, would be its implying such an intimate communion with God as is contrary to the established course of things, by which men are left to acquire all their knowledge by the exercise of their own faculties.—Let us now suppose some of those inspired teachers to tell his countrymen, that he did not desire them, on his *ipse dixit*, to believe that he had any preternatural communion with the Deity, but that for the truth of his assertion he would give them the evidence of their own senses; and after this declaration let us suppose him immediately to raise a person from the dead in their presence, merely by calling upon him to come out of his grave. Would not the only possible objection to the man's veracity be removed by this miracle? and his assertion that he had received such and such doctrines from God be as fully credited as if it related to the most common occurrence? Undoubtedly it would; for, when so much preternatural power was visibly communicated to this person, no one could have reason to question his having received an equal portion of preternatural knowledge. A palpable deviation from the known laws of nature, in one instance, is a sensible proof that such a deviation is possible in another; and in such a case as this it is the witness of God to the truth of a man.

Miracles, then, under which we include prophecy, are the only direct evidence which can be given of divine inspiration. When a religion, or any religious truth, is to be revealed from heaven, they appear to be absolutely necessary to enforce its reception among men; and this is the only case in which we can suppose them necessary, or believe for a moment that they ever have been or will be performed.

The history of almost every religion abounds with relations of prodigies and wonders, and of the intercourse of men with the gods; but we know

of no religious system, those of the Jews and Christians excepted, which appealed to miracles as the sole evidence of its truth and divinity. The pretended miracles mentioned by Pagan historians and poets are not said to have been publicly wrought to enforce the truth of a new religion contrary to the reigning idolatry. Many of them may be clearly shown to have been mere natural events. Others are represented as having been performed in secret on the most trivial occasions, and in obscure and fabulous ages long prior to the era of the writers by whom they are recorded. And such of them as at first view appear to be best attested, are evidently tricks contrived for interested purposes; to flatter power, or to promote the prevailing superstitions. For these reasons, as well as on account of the immoral character of the divinities by whom they are said to have been wrought, they are altogether unworthy of examination, and carry in the very nature of them the completest proofs of falsehood and imposture.

But the miracles recorded of Moses and of Christ bear a very different character. None of them is represented as wrought on trivial occasions. The writers who mention them were eyewitnesses of the facts; which they affirm to have been performed publicly, in attestation of the truth of their respective systems. They are indeed so incorporated with these systems, that *the miracles cannot be separated from the doctrines; and if the miracles were not really performed, the doctrines cannot possibly be true.* Besides all this, they were wrought in support of revelations which opposed all the religious systems, superstitions, and prejudices, of the age in which they were given: a circumstance which of itself sets them, in point of authority, infinitely above the Pagan prodigies, as well as the lying wonders of the Romish church.

It is indeed, we believe, universally admitted, that the miracles mentioned in the book of Exodus and in the four Gospels, might, to those who saw them performed, be sufficient evidence of the divine inspiration of Moses and of Christ; but to us it may be thought that they are no evidence whatever, as we must believe in the miracles themselves, if we believe in them at all, upon the bare authority of human testimony. Why, it has been sometimes asked, are not miracles wrought in all ages and countries? If the religion of Christ were to be of perpetual duration, every generation of men ought to have complete evidence of its truth and divinity.

To the performance of miracles in every age and in every country, perhaps the same objections lie as to the immediate inspiration of every individual. Were those miracles universally received as such, men would be so overwhelmed with the nature rather than with the force of their authority, as hardly to remain masters of their own conduct; and in that case the very end of all miracles would be defeated by their frequency. The truth, however, seems to be, that miracles so frequently repeated would not be received as such, and of course would have no authority; because it would be difficult, and in many cases impossible, to distinguish them from natural events. If they recurred regularly at certain intervals, we could not prove them to be deviations from the known laws of nature, because we should have the same experience for the one series of events as for the other; for the regular succession of preternatural effects, as for the established constitution and course of things.

Be this, however, as it may, we shall take the liberty to affirm, that for the reality of the Gospel miracles we have evidence as convincing to the reflecting mind, though not so striking to vulgar apprehension, as those had who were contemporary with Christ and his apostles, and actually saw the mighty works which he performed. To the admirers of Mr. Hume's philosophy this assertion will appear an extravagant paradox; but we hope to demonstrate its truth from principles which, consistently with himself, that author could not have denied. He has indeed endeavoured to prove, that "no testimony is sufficient to establish a miracle;" and the reasoning employed for this purpose is, that "a miracle being a violation of the laws of nature, which a firm and unalterable experience has established, the proof against a miracle, from the very nature of the fact, is as entire as any argument from experience can be; whereas our experience of human veracity, which (according to him) is the sole foundation of the evidence of testimony, is far from being uniform, and can therefore never preponderate against that experience which admits of no exception." This boasted and plausible argument has with equal candour and acuteness been examined by Dr. Campbell; who justly observes, that so far is experience from being the sole foundation of the evidence of testimony, that, on the contrary, testimony is the sole foundation of by far the greater part of what Mr. Hume calls firm and unalterable experience; and that if in certain circumstances we did not give an implicit faith to testimony, our knowledge of events would be confined to those which had fallen under the immediate observation of our own senses. See Abridgement.

But though Dr. Campbell has exposed the sophistry of his opponent's reasoning, and overturned the principles from which he reasons, we are persuaded that he might safely have joined issue with him upon those very principles. To us, at least, it appears that the testimony upon which we receive the Gospel miracles is precisely of that kind which Mr. Hume has acknowledged sufficient to establish even a miracle. "No testimony (says he) is sufficient to establish a miracle, unless the testimony be of such a kind that its falsehood would be more miraculous than the fact which it endeavours to establish. When one tells me that he saw a dead man restored to life, I immediately consider with myself whether it be more probable that this person should either deceive or be deceived, or that the fact which he relates should really have happened. I weigh the one miracle against the other; and according to the superiority which I discover I pronounce my decision, and always reject the greater miracle." In this passage every reader may remark, what did not escape the perspicacious eye of Dr. Campbell, a strange confusion of terms: but as all miracles are equally easy to the Almighty; and, as Mr. Hume has elsewhere observed, that "the raising of a feather, when the wind wants ever so little of a force requisite for that purpose, is as real a miracle as the raising of a house or a ship into the air;" candour obliges us to suppose, that by talking of greater and less miracles, and of always rejecting the greater, he meant nothing more, but that of two deviations from the known laws of nature he always rejects that which in itself is least probable.

If then we can shew that the testimony given by the apostles and other first preachers of Christianity to the miracles of their Master would, upon the

supposition that those miracles were not really performed, have been as great a deviation from the known laws of nature as the miracles themselves, the balance must be considered as evenly poised by opposite miracles; and whilst it continues so, the judgment must remain in a state of suspense. But if it shall appear, that in this case the false testimony would have been a deviation from the laws of nature less probable in itself than the miracles recorded in the Gospels, the balance will be instantly destroyed; and by Mr. Hume's maxim we shall be obliged to reject the supposition of falsehood in the testimony of the apostles, and admit the miracles of Christ to have been really performed.

In this argument we need not waste time in proving that those miracles, as they are represented in the writings of the New Testament, were of such a nature, and performed before so many witnesses, that no imposition could possibly be practised on the senses of those who affirm that they were present. From every page of the Gospels this is so evident, that the philosophical adversaries of the Christian faith never suppose the apostles to have been themselves deceived, but boldly accuse them of bearing false witness. But if this accusation be well founded, their testimony itself is as great a miracle as any which they record of themselves or of their Master.

Ideas and relations are in the mind of every man so closely associated with the words by which they are expressed in his native tongue, and in every other language of which he is master, that the one cannot be entirely separated from the other; and therefore no man can on any occasion speak falsehood without some effort; by no effort can a man give consistency to an unpremeditated detail of falsehood, if it be of any length, and include a number of particulars; and it is still less possible for several men to agree in such a detail, when at a distance from each other, and cross-questioned by their enemies.

This being the case, it follows, if the testimony of the apostles to their own and their Master's miracles be false, either that they must have concerted a consistent scheme of falsehood, and agreed to publish it at every hazard; or that God, or some powerful agent appointed by him, must have dissolved all the associations formed in their minds between ideas of sense and the words of language, and arbitrarily formed new associations, all in exact conformity to each other, but all in direct contradiction to truth. One or other of these events must have taken place; because, upon the supposition of falsehood, there is no other alternative. But such a dissolution and formation of associations as the latter implies, must, to every man who shall attentively consider it, appear to be as real a miracle, and to require as great an exertion of power, as the resurrection of the dead. Nor is the supposed voluntary agreement of the apostles in a scheme of falsehood an event less miraculous. When they sat down to fabricate their pretended revelation, and to contrive a series of miracles to which they were unanimously to appeal for its truth, it is plain, since they proved successful in their daring enterprise, that they must have clearly foreseen every possible circumstance in which they could be placed, and have prepared consistent answers to every question that could be put to them by their most inveterate and most enlightened enemies; by the statesman, the lawyer, the philosopher, and the priest. That such foreknowledge as this would have been miraculous will not surely be denied; since it forms the very attribute which we find it most difficult to allow even to God himself. It is not, however, the only miracle which this supposition would compel us to swallow. The very resolution of the apostles to propagate the belief of false miracles in support of such a religion as that which is taught in the New Testament, is as great a miracle as human imagination can easily conceive.

When they formed this design, either they must have hoped to succeed, or they must have foreseen that they should fail in their undertaking; and in either case, they chose evil for its own sake. They could not, if they foresaw that they should fail, look for any thing but that contempt, disgrace, and persecution, which were then the inevitable consequences of an unsuccessful endeavour to overthrow the established religion. Nor could their prospects be brighter upon the supposition of their success. As they knew themselves to be false witnesses and impious deceivers, they could have no hopes beyond the grave; and by determining to oppose all the religious systems, superstitions, and prejudices of the age in which they lived, they wilfully exposed themselves to inevitable misery in the present life, to insult and imprisonment, to stripes and death. Nor can it be said that they might look forward to power and affluence when they should, through sufferings, have converted their countrymen; for so desirous were they of obtaining nothing but misery as the end of their mission, that they made their own persecution a test of the truth of their doctrines. They introduced the Master, from whom they pretended to have received these doctrines, as telling them that "they were sent forth as sheep in the midst of wolves; that they should be delivered up to councils, and scourged in synagogues; that they should be hated of all men for his name's sake; that the brother should deliver up the brother to death, and the father the child; and that he who took not up his cross and followed after him was not worthy of him." The very system of religion, therefore, which they invented and resolved to impose upon mankind, was so contrived, that the worldly prosperity of its first preachers, and even their exemption from persecution, was incompatible with its success. Had these clear predictions of the Author of that religion, under whom the apostles acted only as ministers, not been verified, all mankind must have instantly perceived that their pretence to inspiration was false, and that Christianity was a scandalous and impudent imposture. All this the apostles could not but foresee when they formed their plan for deluding the world. Whence it follows, that when they resolved to support their pretended revelation by an appeal to forged miracles, they wilfully and with their eyes open exposed themselves to inevitable misery, whether they should succeed or fail in their enterprise; and that they concerted their measures so as not to admit of a possibility of recompense to themselves, either in this life or in that which is to come. But if there be a law of nature, for the reality of which we have better evidence than we have for others, it is, "that no man can choose misery for its own sake," or make the acquisition of it the ultimate end of his pursuit. The existence of other laws of nature we know by testimony and our own observation of the regularity of their effects. The existence of this law is made known to us not only by these means, but also by the still clearer and more conclusive evidence of our own consciousness.

Thus, then, do miracles force themselves upon our assent in every possible view which we can take of this interesting subject. If the testimony of the first preachers of Christianity was true, the miracles recorded in the Gospel were certainly performed, and the doctrines of our religion are derived from heaven. On the other hand, if that testimony was false, either God must have miraculously effaced from the minds of those by whom it was given all the associations formed between their sensible ideas and the words of language, or he must have endowed those men with the gift of prescience, and have impelled them to fabricate a pretended revelation for the purpose of deceiving the world, and involving themselves in certain and foreseen destruction.

The power necessary to perform the one series of these miracles may, for any thing known to us, be as great as that which would be requisite for the performance of the other; and considered merely as exertions of preternatural power, they may seem to balance each other, and to hold the mind in a state of suspense. But when we take into consideration the different purposes for which these opposite and contending miracles were wrought, the balance is instantly destroyed. The miracles recorded in the Gospels, if real, were wrought in support of a revelation which, in the opinion of all by whom it is received, has brought to light many important truths which could not otherwise have been made known to men; and which, by the confession of its adversaries, contains the purest moral precepts by which the conduct of mankind was ever directed. The opposite series of miracles, if real, was performed to enable, and even to compel, a company of Jews, of the lowest rank and of the narrowest education, to fabricate, with the view of inevitable destruction to themselves, a consistent scheme of falsehood, and by an appeal to forged miracles to impose it upon the world as a revelation from heaven. The object of the former miracles is worthy of a God of infinite wisdom, goodness, and power. The object of the latter is absolutely inconsistent with wisdom and goodness, which are demonstrably attributes of that Being by whom alone miracles can be performed. Whence it follows, that the supposition of the apostles bearing *false* testimony to the miracles of their Master, implies a series of deviations from the laws of nature infinitely less probable in themselves than those miracles: and therefore, by Mr. Hume's maxim, we must necessarily reject the supposition of falsehood in the testimony, and admit the reality of the miracles. So true is it, that for the reality of the Gospel-miracles we have evidence as convincing to the reflecting mind, as those had who were contemporary with Christ and his apostles, and were actual witnesses to their mighty works.

As much of the discussion relative to miracles, according to the channel into which it has been thrown by Mr. Hume and his disciples, is made to turn upon the phrase "laws of nature;" we must not forget to remark that in this enquiry, nothing can consistently be meant by the laws of nature but those laws by which both the *moral* and *physical* worlds are governed; and that since this question respects altogether the *moral* government of God, the *moral* laws of nature ought here to fall principally under consideration. This consideration, however, is totally lost sight of, and the physical laws alone regarded by Mr. Hume in estimating the credibility of miracles; which is just as absurd as it would be to refer solely to the laws of contracts, oaths, and promises, the criteria of virtue and vice, and other moral principles, in order to investigate a correct and unobjectionable theory of *physical astronomy*.

Considered, then, in this point of view, it is evident that the extraordinary nature of the fact is no ground for disbelief, provided such a fact *morally* contemplated, was from the condition of man become necessary; for in that case, the Deity, by dispensing his assistance in proportion to our wants, acted upon the same principle as in his more ordinary occupations. For whatever the *physical* effects may be, if their *moral* tendency be the same, they form a part of the same moral law. Now in the events called miraculous, the Deity *is* influenced by the same moral principle as in his usual dispensations; and being induced by the same motive to accomplish the same end, the laws of God's moral government are not violated, such laws being established by the *motives* and the *ends produced*, and not by the *means employed*. In estimating, therefore, the credibility of a miracle, we look at the *moral* not the *physical* effect; and it is on this account that every unbiassed mind is compelled almost antecedent to any enquiry to reject most of the pretended miracles of the Romish church. But estimating the miracles of the apostolic age by this criterion, there cannot be found the shadow of a reason for rejecting them.

In this enquiry, too, it ought not to be forgotten that many of the first adversaries of our religion, and those the most formidable, never disputed the truth and reality of miracles; on the contrary, they mention them as having been performed. The Jews themselves acknowledged their reality. Julian and Celsus, two avowed enemies of Christianity, amongst all the arts which they used to destroy its credibility, ventured not to deny that our Saviour and his apostles wrought miracles; but ascribed them to magic. Facts confessed by those who had the greatest interest in denying them, ought to be admitted. But such is the hardihood of unbelief, such the impenetrability of the mind, when conviction must lead to an abandonment of practical as well as mental error, that our modern infidels deny what the first unbelievers with all *their superior* means of information found themselves obliged to admit. See farther the articles Abridgement, Celsus, Christianity, Credibility, Julian, Porphyry, &c.

MIRA'CULOUS. *a.* (*miraculeux*, French.) Done by miracle; produced by miracle; effected by power more than natural (*Herbert*).

MIRA'CULOUSLY. *ad.* By miracle; by power above that of nature (*Dryden*).

MIRA'CULOUSNESS. *s.* (from *miraculous*.) The state of being effected by miracle; superiority to natural power.

MIRADO'R. *s.* (Spanish, from *mirar*, to look.) A balcony (*Dryden*).

MIRANDA DO CORVO, a town of Portugal, in Beira, 15 miles S.E. of Coimbra. Lon. 8. 10 W. Lat. 40. 2 N.

MIRANDA DE EBRO, a town of Old Castile, in Spain, 34 miles S. of Bilboa. Lat. 42. 49 N. Lon. 3. 10 W.

MIRANDE, a town of Gascony, in France. Lat. 43. 30 N. Lon. 0. 26 E.

MIRANDO DE DOURO, the capital of Tra los Montes, in Portugal. It is the see of a bishop, is well fortified, and is 37 miles

N.W. of Salamanca. Lat. 41. 40 N. Lon. 6. 0 W.

MIRANDOLA, the capital of a duchy of the same name in Italy. It was taken by the king of Sardinia in 1742. It is 20 miles N.E. of Modena. Lat. 44. 52 N. Lon. 11. 19 E.

MIRANDULA. See Picus.

MIRE. s. (*moer*, Dutch.) Mud; dirt at the bottom of water (*Roscommon*).

To Mire. *v. a.* (from the noun.) To whelm in the mud; to soil with mud (*Shakspeare*).

Mire. *s.* (mýra, Sax. *mier*, Dutch.) An ant; a pismire.

MI'RINESS. *s.* (from *miry*.) Dirtiness; fulness of mire.

MI'RKSOME, *a.* Dark; obscure (*Spenser*).

MIRROUR, in catoptrics, any polished body impervious to the rays of light, and which reflects them equally.

Mirrours were anciently made of metal; but, at present, they are generally smooth plates of glass, tinned or quicksilvered on the back part, and called looking-glasses. The doctrine of mirrours depends wholly on that fundamental law, that the angle of reflection is always equal to the angle of incidence. See Optics.

Parallel rays falling directly on a plane speculum are reflected back upon themselves; if they fall obliquely, they are reflected in the same angle, and parallel as they fell. Hence there is no such thing, properly speaking, as a focus belonging to a plane speculum, neither real nor virtual. The focus of parallel rays is called the solar focus; because in that the image of the sun is formed, and of all objects very remote. But the focus of any object situated near the mirrour, will have its distance from the vertex more or less than half the radius; the rule in all cases being as follows: "Multiply the distance of the object into the radius of the mirrour, and divide the product by the sum of the radius, and twice the distance of the object; the quotient will be the focal distance of a convex mirrour."

Again, for a concave mirrour, the same product of the radius into the distance of the object, divided by the difference of radius and twice the distance of the object, will give the focal distance. And here we are to observe, that, as twice the distance of the object is lesser or greater than the radius, so the focus will be positive or negative, that is, behind the glass or before it.

The image of the object is formed in the focus proper to its distance, and, since the writers on optics demonstrate that the angles under which the object and its image are seen from the centre or vertex of the mirrour are always equal, it follows, that the image will be always in proportion to the object, as the focal distance to the object's distance. The position of the object will be always erect at a positive focus, or behind the speculum diminished by a convex, and magnified by a concave one. Hence, since a convex has but one, viz. an affirmative focus; so it can never magnify any object, howsoever posited before it.

The position of the image in a negative focus, or that before the glass, will be ever inverted; and, if nearer the vertex than the centre, it will be less; if further from it, it will be greater than the object; but in the centre it will be equal to the object, and seen to touch it.

The image formed by a plane speculum is erect, large as the life, at the same apparent distance behind the glass as the object is before it, and on the same side of the glass with the object. Those properties render this sort of mirrour of most common use, viz. as a looking-glass.

If the rays fall directly, or nearly so, on a plane mirrour, and the object be opaque, there will be but one single image formed, or at least be visible, and that by the second surface of the speculum, and not by the first, through which the rays do most of them pass.

But if the object be luminous, and the rays fall very obliquely on the speculum, there will be more than one image formed to an eye placed in a proper position to view them. The first image being formed by the first surface, will not be so bright as the second, which is formed by the second surface. The third, fourth, &c. images are produced by several reflections of the rays between the two surfaces of the speculum; and, since some light is lost by each reflection, the images from the second will appear still more faint and obscure to the eighth, ninth, or tenth, which can scarcely be discerned at all.

Mirrours may be divided into plane, concave, convex, cylindrical, conical, parabolical, and elliptical.

The properties of cylindrical mirrours are, 1. The dimensions of objects corresponding lengthwise to the mirrour are not much changed; but those corresponding breadthwise have their figures altered, and their dimensions lessened the further from the mirrour; whence arises a very great distortion. 2. If the plane of the reflection cut the cylindric mirrour through the axis, the reflection is performed in the same manner as in a plane mirrour; and if parallel to the base, the reflection is the same as in a spherical mirrour; if it cut it obliquely, the reflection is the same as in an elliptic mirrour. Hence, as the plane of reflection never passes through the axis of the mirrour, except when the eye and objective line are in the same plane; nor parallel to the base, except when the radiant point and the eye are at the same height; the reflection is therefore usually the same as in an elliptic one. 3. If a hollow cylindric mirrour be directly opposed to the sun, instead of a focus of a point, the rays will be reflected into a lucid line parallel to its axis, at a distance somewhat less than a fourth of its diameter. Hence arises a method of drawing anamorphoses, that is, wild deformed figures on a plane, which appear well proportioned when viewed in a cylindric mirrour.

In an elliptic mirrour, if a ray strike on it from one of its focuses, it is reflected into the

other. Parabolic mirrours (such, we mean, as are in the form of hollow paraboloids) as all the rays they reflect meet in one point, make the best burning-glasses.

MIRTH. *s.* (myrhbe, Saxon.) Merriment; jollity; gayety; laughter (*Pope*).

MI'RTHFUL. *a.* (*mirth* and *full.*) Merry, gay; cheerful (*Ben Jonson*).

MI'RTHLESS. *a.* (from *mirth.*) Joyless; cheerless.

MI'RY. *a.* (from *mire.*) 1. Deep in mud; muddy (*Temple*). 2. Consisting of mire (*Shakspeare*).

MIS, an inseparable particle used in composition to mark an ill sense, or depravation of the meaning: as *chance*, luck; *mischance*, ill luck; from *mes*, French, used in the same sense.

MISACCEPTATION. *s.* (*mis* and *acceptation.*) The act of taking in a wrong sense.

MISADVENTURE. *s.* (*misadventure*, Fr.) Mischance; misfortune; ill luck (*Clarendon*).

MISADVE'NTURED. *a.* (from *misadventure.*) Unfortunate (*Shakspeare*).

MISADVI'SED. *a.* (*mis* and *advised.*) Ill directed.

MISA'IMED. *a.* (*mis* and *aim.*) Not aimed rightly (*Spenser*).

MI'SANTHROPE. MISA'NTHROPOS. *s.* (*misanthrope*, Fr. μισανθρωπος.) A hater of mankind (*Shakspeare*).

MISA'NTHROPY. *s.* (*misanthropie*, Fr.) Hatred of mankind.

MISAPPLICA'TION. *s.* (*mis* and *application.*) Application to a wrong purpose (*Brown*).

To MISAPPLY'. *v. a.* (*mis* and *apply.*) To apply to wrong purposes (*Howel*).

To MISAPPREHE'ND. *v. a.* (*mis* and *apprehend.*) Not to understand rightly (*Locke*).

MISAPPREHE'NSION. *s.* (*mis* and *apprehension.*) Mistake; not right apprehension.

To MISASCRI'BE. *v. a.* (*mis* and *ascribe.*) To ascribe falsely (*Boyle*).

To MISASSI'GN. *v. a.* (*mis* and *assign.*) To assign erroneously (*Boyle*).

To MISBECO'ME. *v. a.* (*mis* and *become.*) Not to become; to be unseemly; not to suit (*Sidney*).

MISBEGO'T. MISBEGO'TTEN. *a.* (*begot* or *begotten* with *mis.*) Unlawfully or irregularly begotten (*Dryden*).

To MISBEHA'VE. *v. n.* (*mis* and *behave.*) To act ill or improperly (*Young*).

MISBEHA'VED. *a.* (*mis* and *behaved.*) Untaught; ill-bred; uncivil (*Shakspeare*).

MISBEHA'VIOUR. *s.* (*mis* and *behaviour.*) Ill conduct; bad practice (*Addison*).

MISBELI'EF. *s.* (*mis* and *belief.*) False religion; a wrong belief.

MISBELI'EVER. *s.* (*mis* and *believer.*) One that holds a false religion, or believes wrongly (*Dryden*).

To MISCA'L. *v. a.* (*mis* and *call.*) To name improperly (*Glanville*).

To MISCA'LCULATE. *v. a.* (*mis* and *calculate.*) To reckon wrong (*Arbuthnot*).

MISCA'RRIAGE. *s.* (*mis* and *carriage.*) 1. Unhappy event of an undertaking; failure, ill conduct (*Rogers*). 2. Abortion; act of bringing forth before the time (*Graunt*).

To MISCA'RRY. *v. n.* (*mis* and *carry.*) 1. To fail; not to have the intended event; not to succeed (*Shakspeare*). 2. To have an abortion (*Pope*).

To MISCA'ST. *v. a.* (*mis* and *cast.*) To take a wrong account of (*Brown*).

MISCELLA'NE. *s.* (*miscellaneus*, Latin.) Mixed corn: as, wheat and rye (*Bacon*).

MISCELLA'NEOUS. *a.* (*miscellaneus*, Lat.) Mingled; composed of various kinds (*Brown*).

MISCELLANEÆ, in botany, the name of the fifty-fourth order in Linnæus's Fragments of a Natural Method, consisting of plants, which not being connected together by numerous relations, in their habit and structure, as the natural families, are assembled into one head, under the general title of miscellaneous plants.

MISCELLA'NEOUSNESS. *s.* (from *miscellaneous.*) Composition of various kinds.

MI'SCELLANY. *a.* (*miscellaneus*, Latin.) Mixed of various kinds (*Bacon*).

MI'SCELLANY. *s.* A mass formed out of various kinds (*Pope*).

MISCHA'NCE. *s.* (*mis* and *chance.*) Ill luck; ill fortune; misfortune; mishap (*South*).

MI'SCHIEF. *s.* (*meschef*, old French.) 1. Harm; hurt; whatever is ill and injuriously done (*Rowe*). 2. Ill consequence; vexatious affair (*Swift*).

To MI'SCHIEF. *v. a.* (from the noun.) To hurt; to harm; to injure (*Sprat*).

MI'SCHIEFMAKER. *s.* (from *mischief* and *make.*) One who causes mischief.

MI'SCHIEVOUS. *a.* (from *mischief.*) 1. Harmful; hurtful; destructive; noxious; pernicious; injurious; wicked (*South*). 2. Spiteful; malicious (*Ainsworth*).

MI'SCHIEVOUSLY. *ad.* Noxiously; hurtfully; wickedly (*Dryden*).

MI'SCHIEVOUSNESS. *s.* Hurtfulness; perniciousness; wickedness (*South*).

MISCHNA, or MISNA, from שנה, *iteravit*, a part of the Jewish Talmud.

The Mischna contains the text; and the Gemara, which is the second part of the Talmud, contains the commentaries; so that the Gemara is, as it were, a glossary on the Mischna.

The Mischna consists of various traditions of the Jews, and of explanations of several passages of scripture: these traditions, serving as an explication of the written law, and supplement to it, are said to have been delivered to Moses during the time of his abode on the mount; which he afterwards communicated to Aaron, Eleazer, and his servant Joshua. By these they were transmitted to the seventy elders, by them to the prophets, who communicated them to the men of the great sanhedrim, from whom the wise men of Jerusalem and Babylon received them. According to Prideaux's account, they passed from Jeremiah

to Baruch, from him to Ezra, and from Ezra to the men of the great synagogue, the last of whom was Simon the Just; who delivered them to Antigonus of Socho; and from him they came down in regular succession to Simeon, who took our Saviour in his arms; Gamaliel, at whose feet Paul was educated; and last of all to Rabbi Judah the Holy, who committed them to writing in the Mischna. But Dr. Prideaux rejecting this Jewish fiction, observes, that after the death of Simon the Just, about two hundred and ninety-two years before Christ, the Mischnical doctors arose, who, by their comments and conclusions, added to the number of those traditions which had been received and allowed by Ezra, and the men of the great synagogue; so that towards the middle of the second century, after Christ, under the empire of Antoninus Pius, it was found necessary to commit these traditions to writing; more especially as their country had considerably suffered under Adrian, and many of their schools had been dissolved, and their learned men cut off; and, therefore, the usual method of preserving their traditions had failed. Rabbi Judah, on this occasion, being rector of the school at Tiberias, and president of the sanhedrim in that place, undertook the work, and compiled it in six books, each consisting of several tracts, which altogether make up the number of sixty-three. (Prid. Connect. vol. ii. p. 468, &c. ed. 9.) This learned author computes that the Mischna was composed about the 150th year of our Lord; but Dr. Lightfoot says, that Rabbi Judah compiled the Mischna about the year of Christ 190, in the latter end of the reign of Commodus; or, as some compute, in the year of Christ 220. Dr. Lardner is of opinion that this work could not have been finished before the year 190, or later. (Collect. of Jewish and Heathen Testimonies, &c. vol. i. p. 178.) Thus the book called the Mischna was formed; a book which the Jews have generally received with the greatest veneration. The original has been published, with a Latin translation, by Surenhusius, with notes of his own, and others from the learned Maimonides, &c. in 6 vols. fol. Amsterdam, A. D. 1698—1703. See TALMUD.

It is written in a much purer style, and is not near so full of dreams and visions as the Gemara.

MI'SCIBLE. *a.* (from *misceo*, Lat.) Possible to be mingled (*Arbuthnot*).

MISCITA'TION. *s.* (*mis* and *citation.*) Unfair or false quotation (*Collier*).

To MISCI'TE. *v. a.* (*mis* and *cite.*) To quote wrong.

MISCLA'IM. *s.* (*mis* and *claim.*) Mistaken claim (*Bacon*).

MISCOMPUTA'TION. *s.* (*mis* and *computation.*) False reckoning (*Clarendon*).

MISCONCE'IT. MISCONCE'PTION. *s.* (*mis* and *conceit*, and *conception.*) False opinion; wrong notion (*Hooker*).

MISCONCE'IVE. *v. a.* (*mis* and *conceive.*) To misjudge; to have a false notion of (*Shak.*).

MISCO'NDUCT. *s.* (*mis* and *conduct.*) Ill behaviour; ill management (*Rogers*).

To MISCONDU'CT. *v. a.* (*mis* and *conduct.*) To manage amiss; to carry on wrong.

MISCONJE'CTURE. *s.* (*mis* and *conjecture.*) A wrong guess (*Brown*).

MISCONSTRU'CTION. *s.* (*mis* and *construction.*) Wrong interpretation of words or things.

To MISCO'NSTRUE. *v. a.* (*mis* and *construe.*) To interpret wrong (*Raleigh*).

To MISCO'UNT. *v. a.* (*mescounter*, Fr. *mis* and *count.*) To reckon wrong (*Shak.*).

MI'SCREANCE. MI'SCREANCY. *s.* (from *mescreance*, French.) Unbelief; false faith; adherence to a false religion (*Swift*).

MI'SCREANT. *s.* (*mescreant*, French.) 1. One that holds a false faith; one who believes in false gods (*Hooker*). 2. A vile wretch (*Addison*).

MISCREA'TE. MISCREA'TED. *a.* (*mis* and *create.*) Formed unnaturally or illegitimately; made as by a blunder of nature (*Shakspeare*).

MISDE'ED. *s.* (*mis* and *deed.*) Evil action. (*Shakspeare*).

To MISDE'EM. *v. a.* (*mis* and *deem.*) To judge ill of; to mistake (*Davies*).

To MISDEME'AN. *v. a.* (*mis* and *demean.*) To behave ill (*Shakspeare*).

MISDEME'ANOUR, an offence, or fault, particularly when in the execution of an office.

A crime, or misdemeanour, says judge Blackstone, is an act committed, or omitted, in violation of a public law, either forbidding or commanding it. This general definition comprehends both crimes and misdemeanours; which, properly speaking, are mere synonymous terms; though, in common usage, the word *crimes* is made to denote such offences as are of a deeper and more atrocious dye; while smaller faults, and omissions of less consequence, are comprized under the gentler name of misdemeanours only.

High crimes and misdemeanours denote offences of a heinous nature, next to high treason.

To MISDO'. *v. a.* (*mis* and *do.*) To do wrong; to commit a crime (*Milton*).

To MISDO'. *v. n.* To commit faults (*Dryden*).

MISDO'ER. *s.* (from *misdo.*) An offender; a criminal; a malefactor (*Spenser*).

MISDO'ING. *s.* (from *misdo.*) Offence; deviation from right (*L'Estrange*).

To MISDO'UBT. *v. a.* (*mis* and *doubt.*) To suspect of deceit or danger (*Dryden*).

MISDO'UBT. *s.* (*mis* and *doubt.*) 1. Suspicion of crime or danger (*Shakspeare*). 2. Irresolution; hesitation (*Shakspeare*).

MISE, a French term, literally denoting expence, or disbursement: it is used in our law-books in divers acceptations. Sometimes for the profits of lands; sometimes for taxes, or taillages; and sometimes for expences, or costs: as, *pro misis et custagiis*, for costs and charges in the entries of judgments, &c.

MISE more peculiarly denotes an honorary gift, or customary present, wherewith the people of Wales used to salute every new king and prince of Wales at their entrance upon the principality.

Anciently, the mise was given in cattle, wine, corn, &c. for the support of the prince's family; but when that dominion was annexed to the English crown, the gift was changed into money. The county of Flint paid two thousand marks, &c. for their mise.

The county of Chester also paid a mise or tribute of five thousand marks at the change of every owner of the said earldom, for enjoying the privileges of that palatinate. At Chester they have a mise-book, wherein every town and village in the county is rated what to pay towards the mise.

MISE is also used in speaking of a writ of right. What in other actions is called an issue, in a writ of right is called a mise or me: so that to join the mise upon the meer, is as much as to say, to join issue on the meer right, i. e. to join upon this point, whether has the more right, the tenant or demandant.

Yet even in a writ of right, if a collateral point be tried, it is there called an issue, not a mise.

MISE is also sometimes used corruptly for mease, a messuage or tenement.

To MISEMPLO'Y. *v. a.* (*mis* and *employ.*) To use to wrong purposes (*Atterbury*).

MISEMPLO'YMENT. *s.* (*mis* and *employment.*) Improper application (*Hale*).

MISEN, MISSON, or MIZEN, in a ship, denotes either the mast, or sail of that name; but at sea they always mean the sail when the word misen is used.

This is the hindmost of the fixed sails of a ship, extended sometimes by a gaff, and sometimes by a yard, which crosses the mast obliquely.

MI'SER. *s.* (*miser*, Latin.) 1. A wretched person: not in use (*Sidney*). 2. A wretch; a mean fellow: not in use (*Shakspeare*). 3. A wretch covetous to extremity (*Otway*).

MI'SERABLE. *a.* (*miserable*, French.) 1. Unhappy; calamitous; wretched (*South*). 2. Wretched; worthless (*Job*). 3. Culpably parsimonious; stingy.

MI'SERABLENESS. *s.* (from *miserable.*) State of misery.

MI'SERABLY. *ad.* (from *miserable.*) 1. Unhappily; calamitously (*South*). 2. Wretchedly; meanly (*Sidney*). 3. Covetously (*Ainsworth*).

MI'SERY. *s.* (*miseria*, Latin.) 1. Wretchedness; unhappiness (*Locke*). 2. Calamity; misfortune (*Shakspeare*). 3. (from *miser.*) Covetousness; avarice (*Wotton*).

To MISFA'SHION. *v. a.* (*mis* and *fashion.*) To form wrong (*Hakewill*).

MISFO'RTUNE. *s.* (*mis* and *fortune.*) Calamity; ill luck; want of good fortune (*Addison*).

To MISGI'VE. *v. a.* (*mis* and *give.*) To fill with doubt; deprive of confidence (*Shak.*).

To MISGO'VERN. *v. a.* (*mis* and *govern.*) To govern ill; to administer unfaithfully (*Kn.*).

MISGO'VERNMENT. *s.* 1. Ill administration of public affairs (*Ral.*). 2. Ill management (*Taylor*). 3. Irregularity; inordinate behaviour (*Shakspeare*).

MISGUI'DANCE. *s.* (*mis* and *guidance.*) False direction (*South*).

To MISGUI'DE. *v. a.* (*mis* and *guide.*) To direct ill; to lead the wrong way (*Locke*).

MISHA'P. *s.* (*mis* and *hap.*) Ill chance; ill luck; calamity (*Spenser*).

MI'SHMASH. *s. Ains.* A low word. A mingle.

To MISINFE'R. *v. a.* (*mis* and *infer.*) To infer wrong (*Hooker*).

To MISINFO'RM. *v. a.* (*mis* and *inform.*) To deceive by false accounts (*Milton*).

MISINFORMA'TION. *s.* (from *misinform.*) False intelligence; false accounts (*South*).

To MISINTE'RPRET. *v. a.* (*mis* and *interpret.*) To explain to a wrong sense (*Ben Jonson*).

To MISJO'IN. *v. a.* (*mis* and *join.*) To join unfitly or improperly (*Dryden.*)

MISITRA, a town of European Turkey, in the Morea; defended by a castle, on a rock, which is said to be impregnable. It was the ancient Sparta. The Christians have several churches, one among them called Perileptos, said to be one of the most beautiful in the world. The Jews have three synagogues; and the Turks have a superb mosque and hospital. It is the see of a Greek archbishop, and the residence of a bey, an aga, and a waywode, and contains 12,000 inhabitants: forty miles S.S.W. Argos, forty E.N.E. Navarin, and sixty S. Corinth. Lon. 22. 30 E. Lat. 37. 6 N.

To MISJU'DGE. *v. n.* (*mis* and *judge.*) To form false opinions; to judge ill (*Pope*).

To MISLA'Y. *v. n.* (*mis* and *lay.*) To lay in a wrong place (*Dryden*).

MISLA'YER. *s.* (from *mislay.*) One that puts in the wrong place (*Bacon*).

To MI'SLE. *v. n.* (from *mist.*) To rain in imperceptible drops (*Derham*).

To MISLE'AD. *v. a.* (*mis* and *lead.*) To guide a wrong way; to betray to mischief or mistake (*Bacon*).

MISLE'ADER. *s.* (from *mislead.*) One that leads to ill (*Shakspeare*).

MI'SLEN. *s.* (corrupted from *miscellane.*) Mixed corn: as, wheat and rye (*Mortimer*).

MISLETOE, in botany. See VISCUM.

To MISLI'KE. *v. a.* (*mis* and *like.*) To disapprove; to be not pleased with (*Herbert*).

MISLI'KE. *s.* (from the verb). Disapprobation; dislike (*Fairfax*).

MISLI'KER. *s.* (from *mislike.*) One that disapproves (*Ascham*).

To MISLI'VE. *v. n.* (*mis* and *live.*) To live ill (*Spenser*).

To MISMA'NAGE. *v. a.* (*mis* and *manage.*) To manage ill (*Locke*).

MISMA'NAGEMENT. (*s. mis* and *ma-*

nagement.) Ill management; ill conduct (*Pope*).

To MISMA'TCH. *v. a.* (*mis* and *match.*) To match unsuitably (*Southern*).

To MISNA'ME. *v. a.* (*mis* and *name.*) To call by the wrong name (*Boyle*).

MISNOMER, in law, a misnaming or mistaking a person's name. The Christian name of a person should always be perfect; but the law is not so strict in regard to surnames, a small mistake in which will be dispensed with to make good a contract, and support the act of the party.

To MISOBSE'RVE. *v. a.* (*mis* and *observe.*) Not to observe accurately (*Locke*).

MISO'GAMIST. *s.* (μισῶ and γάμος.) A marriage hater.

MISO'GYNY. *s.* (μισῶ and γυνή.) Hatred of women.

To MISO'RDER. *v. a.* (*mis* and *order.*) To conduct ill; to manage irregularly (*Shaks.*).

MISO'RDER. *s.* (from the verb.) Irregularity; disorderly proceedings (*Camden*).

MISO'RDERLY. *a.* (from *misorder.*) Irregularly; unlawful (*Ascham*).

To MISPE'ND. *v. a.* (*mis* and *spend.*) To spend ill; to waste; to consume to no purpose; to throw away (*Ben Jonson*).

MISPE'NDER. *s.* (from *mispend.*) One who spends ill or prodigally (*Norris*).

MISPERSUA'SION. *s.* (*mis* and *persuasion.*) Wrong notion; false opinion (*Decay of Piety*).

MISPICKEL, in mineralogy. See FERRUM and ARSENICUM.

To MISPLA'CE. *v. a.* (*mis* and *place.*) To put in a wrong place (*South*).

To MISPRI'SE. *v. a.* Obsolete. 1. To mistake (*Shakspeare*). 2. To slight; to scorn; to despise (*Shakspeare*).

MISPRI'SION. *s.* (from *misprise.*) 1. Scorn; contempt: not in use (*Shakspeare*). 2. Mistake; misconception: not in use (*Gla.*) 3. (In common law.) Neglect, negligence, or oversight. *Misprision* of treason, is the concealment of known treason. *Misprision* of felony, is the letting any person, committed for felony, to go before he be indicted (*Cowell*).

To MISPROPO'RTION. *v. a.* (*mis* and *proportion.*) To join without due proportion.

MISPRO'UD. *a.* (*mis* and *proud.*) Viciously proud: obsolete (*Shakspeare*).

To MISQUO'TE. *v. a.* (*mis* and *quote.*) To quote falsely (*Shakspeare*).

To MISRECI'TE. *v. a.* (*mis* and *recite.*) To recite not according to the truth (*Bramhall*).

To MISRE'CKON. *v. a.* (*mis* and *reckon.*) To reckon wrong; to compute wrong (*Swift*).

To MISRELA'TE. *v. a.* (*mis* and *relate.*) To relate inaccurately or falsely (*Boyle*).

MISRELA'TION. *s.* (from *misrelate.*) False or inaccurate narrative (*Bramhall*).

To MISREME'MBER. *v. a.* (*mis* and *remember.*) To mistake by trusting to memory (*Boyle*).

To MISREPO'RT. *v. a.* (*mis* and *report.*) To give a false account of (*Hooker*).

MISREPO'RT. *s.* False account; false and malicious representation (*South*).

To MISREPRESE'NT. *v. a.* (*mis* and *represent.*) To represent not as it is; to falsify to disadvantage (*Swift*).

MISREPRESENTA'TION. *s.* 1. The act of misrepresenting (*Swift*). 2. Account maliciously false (*Atterbury*).

MISRU'LE. *s.* (*mis* and *rule.*) Tumult; confusion; revel; unjust domination (*Thoms*).

MISS. *s.* (contracted from *mistress.*) 1. The term of honour to a young girl (*Swift*). 2. A strumpet; a concubine (*Dryden*).

To MISS. *v. a.* preter. *missed*; part. *missed* or *mist.* (*missen*, Dutch.) 1. Not to hit by the mind; to mistake (*Milton*). 2. Not to hit by manual aim (*Pope*). 3. To fail of obtaining (*Dryden*). 4. To discover something to be unexpectedly wanting (*Sidney*). 5. To be without (*Shakspeare*). 6. To omit (*Prior*). 7. To perceive want of (*South*).

To MISS. *v. n.* 1. To fly wide; not to hit (*Waller*). 2. Not to succeed (*Bacon*). 3. To fail; to mistake. 4. To be lost; to be wanting (*Milton*). 5. To miscarry; to fail (*Milton*). 6. To fail to obtain, learn, or find (*Atterbury*).

MISS. *s.* (from the verb.) 1. Loss; want (*Locke*). 2. Mistake; errour (*Ascham*). 3. Hurt; harm: obsolete (*Spenser*).

MI'SSAL. *s.* (*missale*, Lat. *missel*, Fr.) The mass book (*Stillingfleet*).

To MISSA'Y. *v. n.* (*mis* and *say.*) To say ill or wrong (*Hakewill*).

To MISSE'EM. *v. n.* (*mis* and *seem.*) 1. To make false appearance (*Spenser*). 2. To misbecome: obsolete both (*Spenser*).

MISSEL BIRD, a species of TURDUS.

To MISSE'RVE. *v. a.* (*mis* and *serve.*) To serve unfaithfully (*Arbuthnot*).

To MISSHA'PE. *v. a.* (*mis* and *shape.*) To shape ill; to form ill; to deform (*Bentley*).

MI'SSILE. *a.* (*missilis*, Latin.) Thrown by the hand; striking at distance (*Pope*).

MISSIO, among the Romans, was a full discharge given to a soldier after twenty years service, and differed from the *exauctoratio*, which was a discharge from duty after seventeen years service. Every soldier had a *right* to claim his missio at the end of twenty years.

MI'SSION. *s.* (*missio*, Latin.) 1. Commission; the state of being sent by supreme authority (*Milton. Atterbury*). 2. Persons sent on any account, usually to propagate religion (*Bacon*). 3. Dismission; discharge: not in use (*Bacon*). 4. Faction; party: not in use (*Shakspeare*).

MISSION, in theology, denotes a power or commission to preach the gospel. Jesus Christ gave his disciples their mission in these words, "Go and teach all nations, &c."

The Romanists reproach the Protestants, that their ministers have no mission; as not being authorised in the exercise of their ministry, either by an uninterrupted succession from the apostles, or by miracles, or by any extraordinary proof of a vocation.

Many among us deny any other mission necessary for the ministry than the talents necessary to discharge it.

Mission is also used for an establishment of people zealous for the glory of God, and the salvation of souls; who go and preach the gospel in remote countries and among infidels.

There are missions in the East, as well as in the West Indies. Among the Romanists, the religious orders of St. Dominic, St. Francis, St. Augustine, and the Jesuits, have missions in the Levant, America, &c.

The Jesuits have had missions in China, and all other parts of the globe, where they have been able to penetrate. The Mendicants abound in missions.

There have been also several Protestant missions for diffusing the light of Christianity through the benighted regions of Asia and America. Of this kind has been the Danish mission, planned by Frederic IV. in 1706. And the liberality of private benefactors in our own country has been also extended to the support of missionaries among the Indians in America, &c.

The first Protestant mission in India was sent out by the Protestant churches of Denmark and Germany, being planned by Frederic IV. as just mentioned. Their two first missionaries, Bartholomew Ziegenbalgh and Henry Plutscho, arrived in India in July 1706: and the Hindoo churches celebrated a jubilee in July 1806, in commemoration of that happy event. During the whole of the last century Providence favoured them with a succession of pious and learned men, educated at the German universities; among whom was the venerable Schwartz, called the apostle of the east; and others not much inferior to him; men whose names are scarcely known in this country, but who are as famous among the Hindoos as Wickliffe and Luther are among us. The ministry of these good men was blessed in many provinces in the south of India to the conversion of more than 18,000 Hindoos; and the bounds of their churches are extending unto this day. The language of the country is called the Tamul; and the first translation of the Bible, in that language, was made about 100 years ago. Like Wickliffe's Bible with us, it became the father of many versions, and, after a succession of improved editions, it is now considered by the Brahmins themselves (like Luther's Bible in German) as the classical standard of the Tamul tongue. The records of this mission are published in upwards of 30 quarto vols. and some interesting extracts from them have been published, during the last 15 months, in the Christian Observer.

The Dutch in the island of Ceylon, and other of their East India settlements, have had still more extensive success. In North America, the apostolic Elliott, in the last century, was the chief instrument of the evident and thorough conversion of many of the native Indians. The Church of England has long established a society for foreign missions. The Presbyterian society in Scotland for propagating Christian knowledge has lent its support to several useful missionaries among the American Indians. The Moravian brethren have, within these seventy years, sent missions to various heathen nations. The Wesleyan Methodists have, within these few years, attempted a mission to the Caribs, who are natives of the West India islands, and have laboured with success among the negro slaves in those islands. Of late years this missionary spirit has revived afresh, and hereby the hopes of Christians have been revived, that the Lord Jesus is about to extend his kingdom in the earth.

The most important society is denominated "The particular Baptist society for propagating the Gospel among the heathens." Its origin was from Mr. Carey, who printed a pamphlet with a view to encourage the sending forth missionaries. His heart appears to have been set upon the conversion of the heathen for several years, and his conversations, prayers, and sermons, were mostly accompanied with something relative to this subject. He possessed, at the same time, a great thirst for geographical knowledge, and a remarkable aptitude at learning languages, so that his most intimate friends were, for several years past, induced to think that he was formed for some such undertaking. His desire that a society might be established amongst his connexions for the propagation of the Gospel among the heathen, and that be might have a share in that important service, continued, and increased, till, at length, in the year 1791, being at a meeting of ministers at Clipstone in Northamptonshire, he proposed a question, "Whether it were not practicable, and our bounden duty, to attempt somewhat toward spreading the Gospel in the heathen world?" The chief thing then agreed upon was to desire Mr. Carey to draw up his thoughts on the subject and publish them. At the annual Baptist association at Nottingham, May 21, 1792, a resolution was made, "that a plan be prepared against the next meeting of ministers at Kettering, for forming a society among the Baptists for propagating the Gospel among the heathens." At the meeting at Kettering, October 2, 1792, a foundation for such a society was laid, and several resolutions agreed to. At a second meeting of the primary society at Northampton, October 31, 1792, Mr. Pearce of Birmingham gave information, that having mentioned the business to his friends they had generously contributed seventy pounds to assist in the noble design. At a third meeting at Northampton, November 13, 1792, some farther resolutions were entered into, and an address of the society to their fellow Christians at large was agreed to be prepared, printed, and circulated. On January 10, 1793, a committee meeting was held at Kettering, when the committee being of opinion that a door was opened in the East Indies, Mr Carey was asked, whether he was inclined to go, who answered in the affirmative. The object now was to calculate the expences, and obtain the means of defraying them. This was soon accomplished, for no sooner was the design made known than cheerful and liberal contributions came from different parts of the kingdom. The church at Leicester, though greatly affected by the loss of a faithful pastor, yet offered no objection to his going. "We have been praying (said one of them) for the spread of Christ's kingdom amongst the heathens; and now God requires us to make the first sacrifice to accomplish it." Before his departure a solemn day was spent in prayer at Leicester, March 20, 1793, when Mr. Fuller of Kettering gave a very suitable and affecting address on the occasion, which is published in the Baptist periodical accounts of their mission, No. I. On June 13, 1793, he set sail on board the Princessa Maria, a Danish East Indiaman, Captain Christmas. Mr. Carey, and Mr. Thomas, who accompanied him, with their families, kept up morning and evening worship in the ship, though surrounded with infidels and profane people; and an infidel who went with them, and is since returned, has said, "If ever there was a good man in this world, Carey was one." Pleasing accounts of his success have been often since received. He has been in

defatigable in his labours, has translated nearly the whole Bible into the Bengalee tongue.

The whole number of persons baptized, from the commencement of the mission to the end of 1808, appears to be about 150, of whom a large proportion are native Indians. Among these, we perceive, with pleasure, no fewer than ten Brahmins, of whom, though several have gone back, yet two are now engaged in preaching the Gospel. Additions have been made to this list since the year 1808.

On the subject of translating the Scriptures into the oriental languages, a statement has been received from the missionaries, of which we will give the substance.

1. The Bengalee Bible is completed. A third edition of it is printing in folio, to be used in public worship.

2. In the Orissa, the New Testament is printed, and nearly the whole Book of Psalms. The edition consists of 1000 copies. A mission is about to be undertaken in Orissa.

3. In the Telinga, the New Testament is translated, and a beginning made in the Old.

4. In the Kernata, the progress is nearly the same as in the Telinga.

5. The translation and printing of the Guserattee had been suspended for the present.

6. In the Mahrattah, the four Gospels are nearly printed off. The whole of the New Testament is translated, and a part of the Old.

7. The printing of the New Testament in Hindoostanee had been suspended after half was completed, but they hoped soon to proceed with it.

8. In the Panjabee, or language of the Seiks, the translation of the New Testament is finished, and the printing begun.

9. In the Sungskrit, the whole of the New Testament is printed off, and as far as the middle of Exodus in the Old.

10. The translation of the Scriptures into the Burman language has been begun by the missionaries.

11. The Chinese translation is in a state of progress; the printing has proceeded as far as the middle of St. Matthew's Gospel.

THE FOLLOWING IS A GENERAL SUMMARY.

LANGUAGES.	PROBABLE EXTENT TO WHICH THEY ARE SPOKEN.	PRESENT PROGRESS.
Bengalee,	About Great Britain,	Bible printed.
Sungskrit,	Read all over India,	N. T. ditto.
Orissa,	About Ireland,	N.T. ditto.
Hindoostanee,	About France and Italy,	N. T. printing.
Mahratta,	About Great Britain,	N. T. ditto.
Guzeratie,		N.T. ditto.
Chinese,	Read all over China,	
Telinga,	About England,	N. T. of these six last
Carnatic,	The same,	translating for the
Siku or Seeks,		press.
Persian,	Persia, read in India,	
Burman,	Burmah, about 70 mill.	

The New Testament in the Malayala is also printing at Serampore for the use of the inhabitants of Travancore.

The following is a List of the Missionaries, now in the East Indies.

Dr. William Carey, sen.	At Serampore and Calcutta.
Mr. Joshua Marshman,	ditto ditto.
William Ward,	ditto ditto.
Joshua Rowe,	ditto ditto.
John Chamberlaine,	Cutwa, in Bengal.
Richard Mardon,	Goamalty, ditto.
William Moore,	Miniary, ditto.
James Chater,	Rangoon, in Burmah.
Felix Carey,	ditto.
William Robertson,	Boutan.
William Carey, jun.	Saddamahl, in Bengal.

Of these missionaries Carey and Marshman are learned as well as pious and diligent men: so that besides their occupations in the mission, which they discharge with great faithfulness and zeal, they employ themselves in making known to their countrymen, through the medium of translations, the most valuable portions of eastern literature. Marshman is now translating the works of Confucius; and has already sent over to England an interesting account of Chinese literature. The labours of these excellent men in fact establish a remarkable era, marked by the contemporaneous translation of the New Testament into twelve eastern languages. Men of no religion may scoff, and men of half learning may sneer; but posterity will class the names of Carey and Marshman with that of sir William Jones, and will be astonished that any literary journal

should have tarnished its reputation by an unprincipled attack upon such men. See further, the Baptist periodical accounts, No. I to 20; and the Quarterly Review, No. 1 and 10.

The establishment of this Baptist society gave rise to another. of a yet more extensive nature, including various denominations of Christians. The first publication which stood in immediate connection with the rise of this society was an address to professors of the Gospel, published in the Evangelical Magazine, September 1794 This address gave occasion to various private conversations; at length, on November 4, 1794, the first concerted meeting with a view to this society took place. It was a small, but glowing and harmonious circle of ministers of various connections and denominations. In January, 1795, a printed address was sent to a considerable number of ministers in London and its neighbourhood, and a meeting was appointed on December 15, 1794, at the Castle and Falcon Inn, Aldersgate-street. At the time specified they met together, and began jointly to call on God in reference to the salvation of the heathens, mingling their applications with the reading of portions of Scripture, and afterwards consulting together on the best expedients for the formation of a regular society; it was unanimously determined, that all party names and inferior distinctions should, in the prosecution of this vast design, be absorbed in the great Christian name and cause. And these meetings, held regularly once a fortnight, with much sacred pleasure and unanimity were resorted to with a gradual increase of numbers, of zeal, hope, and delight A committee of correspondence was opened with brethren in all parts of the country, and at length a general meeting was appointed in September 1795. A preparatory meeting was held on September 21, when the sketch of a plan prepared by the committee was read, which was approved as proper to be laid before the general meeting on the ensning day, and subscription books were opened. On Tuesday, the 22d, and the two following days, there were successively held, in various parts of the city, six solemn assemblies for worship. The animated solemnity, unity, and zeal of these assemblies, which were very great, the spirit with which they were enlivened to the last, and the solid effects of ever-flowing liberality, for the advancement of the work in view, encouraged them to hope the design was of God. On the 25th they proceeded to choose directors and secretaries, and unanimously resolved, that the first attempt of this society should be to send missionaries to Otaheite, or some other of the islands of the South Sea. Accordingly preparations were made and completed, and 30 men, 6 women, and 3 children, approved by the directors, embarked on board the ship Duff, Capt. Wilson, on August 10, 1796, and arrived at Otaheite March 5, 1797.

In addition to the above, we must mention, that the missionary ship Duff, (on a second voyage to Otaheite) as it was entering the harbour of Rio Janeiro on the coast of Spanish America, was captured by the Buonaparte, a French privateer, on the 19th of February, 1799. Not far from the spot where they were captured by the Buonaparte they were retaken by the convoy of the Brazil fleet to Lisbon, "when we were again (says the Rev. Mr. Howell in his Letter to Joseph Hardcastle, Esq. dated Lisbon, Sept. 26, 1799) pleasing ourselves with the prospect of entering the harbour of Rio Janeiro for the purpose of procuring some necessary supplies, and where we hoped to be able to fix the plan of our future movements. Every arrangement in view was, however by this unexpected event, completely superseded; and it was now no longer a question where we should go, but where we must go. Such a peculiar providence indeed, you will readily judge, put an end to every debate on this subject, and finally determined our duty to return home *re infecta*." Thirty-six of the missionaries arrived at Falmouth on the morning of the 12th of October, in the Prince of Wales packet. See farther on the subject of this mission, Quarterly Rev. No 3.

Besides the above mentioned Missionary Societies, others, having the same object in view, have lately been formed in Scotland, at Edinburgh, Glasgow, Aberdeen, Stirling, Kelso, Paisley, Greenock, Perth, Dundee, &c. Some of these have generously contributed to the society of Particular Baptists in England for propagating the Gospel, to be applied towards defraying the expence of printing a translation of the Bible into the Bengalee language, in which their missionaries in the East Indies have already made considerable progress They have also sent kind benefactions to the Missionary Society of London, by which they have expressed, in the strongest terms, their willingness to co-operate in the grand undertaking.

We must not omit noticing the Moravian missions. The United Brethren (commonly called Moravians) have particularly distinguished themselves for many years, in endeavouring to send the Gospel of Christ among heathen nations. From the writings of Count Zinzendorf, and from the sentiments and practices of others among the United Brethren, at certain periods of their history, many have formed unfavourable opinions of the whole denomination, and very harsh accounts have been given of them in some publications of respectability. It may therefore be proper to observe, that the United Brethren do not take the writings of any man as their standard of doctrine; the Bible alone is their standard of truth; and they agree with the Augsburg confession, as being conformable to it, that they acknowledge errors among some of their society at former periods: in particular, that they disclaim many of the extravagancies which are contained in the writings ascribed to Count Zinzendorf; and that from their works of a more recent date they seem now to teach the leading doctrines of the Gospel in great purity, and with much scriptural simplicity.

The most flourishing missions at present are those in Greenland, Antigua, St. Kitt's, the Danish West India islands, and the Cape of Good Hope. A new awakening has appeared of late among the Arawacks and Free Negroes in South America, the Esquimaux of the coast of Labrador, and in Barbadoes. And the latest accounts give us the most pleasing hopes of success in those parts. The inhabitants of the earth amount to about seven hundred and thirty-one millions: four hundred and twenty millions of whom are still in pagan darkness: an hundred and thirty millions the followers of Mohammed; an hundred millions Catholics; forty millions Protestants, thirty millions of the Greek and Armenian churches; and, perhaps, seven millions of Jews. It must undoubtedly strike every considerate mind what a vast proportion of the sons of Adam there

are who yet remain in the most deplorable state of heathen stupidity, without any means of knowing the true God, except what are afforded them by the works of nature, and utterly destitute of the gospel of Christ, or of any means of obtaining it. This lamentable picture is the most cogent argument that can be used against those who oppose missions; and this must furnish our apology for having devoted a few pages to the subject.

MI'SSIONARY. MI'SSIONER. *s.* (*missionaire*, French.) One sent to propagate religion (*Swift. Dryden*).

MISSISIPPI, a river of North America, which is said to rise about the 47th degree of north latitude, and between the 95th and 96th degrees of longitude west from Greenwich. It receives a great number of rivers in its course, and some of them very large: the direction is, with considerable winding, southerly to the Gulf of Mexico, where it empties itself betwen the 89th and 90th degrees of longitude west from London, and the 29th and 30th of north latitude.

MI'SSIVE. *a.* (*missive*, French.) 1. Such as is sent (*Ayliffe*). 2. Used at distance (*Dryden*).

MI'SSIVE. *s.* (French.) 1. A letter sent (*Bacon*). 2. A messenger: both obsolete (*Shakspeare*).

MISSON (Francis Maximilian), whose pleadings before the Parliament of Paris in favour of the reformers bear genuine marks of eloquence and ability, retired into England after the revocation of the edict of Nantz, and became a strenuous assertor of the Protestant religion. In the year 1687 and 1683 he travelled to Italy as governor to an English nobleman: in consequence of which he published at the Hague A new Voyage to Italy, 3 vols. 12mo.; which has been translated into English with many additions. He published also, the Sacred Theatre at Cevennes, or an Account of Prophecies and Miracles performed in that Part of Languedoc. London, 1707. Observations and Remarks of a Traveller, 12mo. Hague. He died at London in 1721.

To MISSPE'AK. *v. a.* (*mis* and *speak.*) To speak wrong (*Donne*).

MISSOURI, a river of North America, whose source is unknown. It joins the Missisippi in lat. 39° E. but is a longer, broader, and deeper river, and is, in fact, the principal stream. It has been ascended by the French traders upwards of 1200 miles, and from its depth and breadth at that distance appeared to be navigable much higher.

MISSUS, in the Circensian games, were the matches in horse or chariot races. The usual number of *missus* or matches in one day was 24; though the emperor Domitian presented the people with 100. The last match was generally made at the expence of the people, who made a collection for the purpose; whence it was called *missus ærarius*, a subscription plate.

MIST. *s.* (mıрт, Saxon.) 1. A low thin cloud; a small thin rain not perceived in drops. (See FOG.) 2 Any thing that dims or darkens (*Dryden*).

To MIST. *v. a.* (from the noun.) To cloud; to cover with a vapour or steam (*Shakspeare*).

MISTA'EN. pret. and part. pass. of *mistake* for *mistaken* (*Shakspeare*).

MISTA'KABLE. *a.* (from *mistake.*) Liable to be conceived wrong (*Brown*).

To MISTA'KE. *v. a.* (*mis* and *take.*) To conceive wrong; to take something for that which it is not (*Stillingfleet*).

To MISTA'KE. *v. n.* To err; not to judge right (*Raleigh*).

To be MISTA'KEN. To err (*Waller*).

MISTA'KE. *s.* (from the verb.) Misconception; errour (*Tillotson*).

MISTA'KINGLY. *ad.* (from *mistaking.*) Erroneously; falsely (*Boyle*).

To MISTA'TE. *v. a.* (*mis* and *state.*) To state wrong (*Sanderson*).

To MISTE'ACH. *v. a.* (*mis* and *teach.*) To teach wrong (*Sanderson*).

To MISTE'MPER. *v. a.* (*mis* and *temper.*) To temper ill; to disorder (*Shakspeare*).

MI'STER. *a.* (from *mestier*, trade, French.) What *mister*, what *kind of*: obsolete (*Spens.*).

To MISTE'RM. *v. a.* (*mis* and *term.*) To term erroneously (*Shakspeare*).

To MISTHI'NK. *v. a.* (*mis* and *think.*) To think ill; to think wrong (*Milton*).

To MISTI'ME. *v. a.* (*mis* and *time.*) Not to time right; not to adapt properly with regard to time.

MI'STINESS. *s.* (from *misty.*) Cloudiness; state of being overcast (*Bacon*).

MI'STION. *s.* (from *mistus*, Latin.) The state of being mingled (*Boyle*).

MISTLETO'E. *s.* (mıӡτleτan, Sax.) See VISCUM.

MI'STLIKE. *a.* (*mist* and *like.*) Resembling a mist (*Shakspeare*).

MI'STRESS. *s.* (*maitresse*. French.) 1. A woman who governs: correlative to *subject* or to *servant* (*Arbuthnot*). 2. A woman who has something in possession (*Sidney*). 3. A woman skilled in any thing (*Addison*). 4. A woman teacher (*Swift*). 5. A woman beloved and courted (*Clarendon*). 6. A term of contemptuous address (*Shakspeare*). 7. A whore; a concubine.

MISTRU'ST. *s.* (*mis* and *trust.*) Diffidence; suspicion; want of confidence (*Milton*).

To MISTRU'ST. *v. a.* To suspect; to doubt; to regard with diffidence (*Cowley*).

MISTRU'STFUL. *a.* (*mistrust* and *full.*) Diffident; doubting (*Waller*).

MISTRU'STFULLY. *ad.* With suspicion.

MISTRU'STFULNESS. *s.* (from *mistrustful.*) Diffidence; doubt (*Sidney*).

MISTRU'STLESS. *a.* (from *mistrust.*) Confident; unsuspecting (*Carew*).

MISTURA. (*mistura.*) In medicine, a mixture. It is mostly contracted into mist. e. g.—f. mist. which means, let it be made into a mixture.

MISTURA CAMPHORÆ. A very cle-

gant preparation of camphire, for delicate stomachs and those who cannot bear it in substance as an antispasmodic and nervine. There is a great loss of camphire in making it as directed by the pharmacopœia. Water can only make up a certain quantity.

MISTURA CRETÆ. A very useful and pleasant form of administering chalk as an astringent and antacid. It is particularly calculated for children, in whom it allays the many deranged actions of the prime viæ, which are produced by acidities. The new Pharmacopœia of the London college contains six other forms.

MISTURA MOSCHI. A diaphoretic and antispasmodic musk julep. It is by far the best way of administering musk, when boluses cannot be swallowed.

MI'STY. *a.* (from *mist.*) 1. Clouded; overspread with mists (*Wotton*). 2. Obscure; dark; not plain.

To MISUNDERSTA'ND. *v. a.* (*mis* and *understand.*) To misconceive; to mistake (*Add.*).

MISUNDERSTA'NDING. *s.* 1. Difference; disagreement (*Swift*). 2. Errour; misconception (*Bacon*).

MISU'SAGE. *s.* (from *misuse.*) 1. Abuse; ill use. 2. Bad treatment.

To MISU'SE. *v. a.* (*mis* and *use.*) To treat or use improperly; to abuse (*South*).

MISU'SE. *s.* (from the verb.) 1. Evil or cruel treatment (*Shakspeare*). 2. Wrong or erroneous use (*Locke*). 3. Misapplication; abuse (*Atterbury*).

To MISWE'EN. *v. n.* (*mis* and *ween.*) To misjudge; to distrust: obsolete (*Spenser*).

To MISWE'ND. *v. n.* (*mis* and *pendan*, Saxon.) To go wrong: obsolete (*Fairfax*).

MISY. In mineralogy. See CHALCANTHA.

MITCHELA, in botany, a genus of the class tetrandria, order monogynia. Corols one-petalled, superior, two on each germ; stigmas four; berry bifid, four-seeded. One species only, M. repens, a North American plant with stem decumbent; leaves opposite, roundish, entire; flowers double, terminal.

MITCHELL (Joseph), a dramatic writer, was born in Scotland in 1684. He was patronized by sir Robert Walpole, but died poor, owing to his extravagance, in 1738. His works are, 1. The Fatal Extravagance, a tragedy; 2. The Highland Fair, a ballad opera, 8vo.; 3. Poems, 2 vols. 8vo.

MITCHELSTOWN, a post town of Ireland, in the county of Cork and province of Munster, 102 miles from Dublin. Here is a college for the support of 12 decayed gentlemen and 12 decayed gentlewomen, who have 40l. yearly, and handsome apartments, and a chaplain at 100l. a-year, with a house: divine service is daily performed in a neat chapel belonging to the college: the whole was founded by the late earl of Kingston. Here is also a most magnificent seat of Lord Kingsborough. —Fairs are held at this town 30th July and 12th of November.

MITE, a small piece of money mentioned Luke xii. 59. and xxi. 2. In the Greek it is κοδραντης, i. e. quadrans, or a quarter of the Roman denarius; so that the mite was worth about seven farthings or two-pence of our money.

MITE, in zoology. See ACARUS.

MITE also denotes any thing proverbially small.

MITELLA. Bastard American sanicle. In botany, a genus of the class decandria, order digynia. Calyx five-cleft; corol five-petalled, inserted into the calyx; the petals pinnatified; capsule one-celled, two-valved; the valves equal. Three species, one of Asia, and two of America, with annual herbaceous stalks, from five or six to eight or nine inches high, with small whitish flowers, the petals fringed at their edges.

MITHRADATES, a herdsman of Astyages, ordered to put young Cyrus to death. He refused, and educated him at home as his own son, &c.—*Herodot. Justin.*

MITHRAS, a god of Persia, supposed to be the sun. His worship was introduced at Rome, and the Romans raised him altars, on which was this inscription, *Deo Soli Mithræ*, or *Soli Deo invicto Mithræ.* He is generally represented as a young man, whose head is covered with a turban, after the manner of the Persia n

MITHRIDATE, MITHRIDATIUM, in pharmacy, an antidote, or composition, in form of an electary; serving either as a remedy or a preservative against poisons. Mithridate is one of the capital medicines in the apothecaries shops, being composed of a vast number of drugs; among which are opium, myrrh, agaric, saffron, ginger, cinnamon, spikenard, frankincense, castor, pepper, gentian, &c.

It is accounted a cordial, opiate, sudorific, and alexipharmic. Matthiolus says, it is more effectual against poison than Venice treacle, and much easier to be made.

It takes its name from its inventor Mithridates, king of Pontus, who is reported to have so fortified his body against poisons, with antidotes and preservatives, that when he had a mind to dispatch himself, he could not find any poison that would take effect.

MITHRIDATE MUSTARD. See THLASPI CAMPESTRE.

MITHRIDATEA, in botany, a genus of the class monandria, order digynia. Receptacle many-flowered, four-cleft, calyxless, corolless, seeds solitary, immersed in the fleshy receptacle. One species only, M. quadrifida, a Madagascar tree, with opposite branches; leaves ever-green, opposite, elliptic, entire, veined; flowers solitary, peduncled, four-cleft lateral; fruit fleshy, the size of an ordinary apple.

MITHRIDATES. This name was common to seven kings of Pontus: the most conspicuous and celebrated of them is the last, sirnamed Eupator and the Great, who succeeded his father Mithridates VI. though only at the age of 11 years. The beginning of his reign was marked by cruelty and artifice. He murdered his own mother, who had been left

by his father coheiress of the kingdom, and he fortified his constitution by drinking antidotes against the poison with which his enemies at court attempted to destroy him. Naturally ambitious and cruel, he spared no pains to acquire himself power and dominion. He murdered the two sons whom his sister Laodice had had by Ariarathes, king of Cappadocia, and placed one of his own children, only eight years old, on the vacant throne. The Romans became the arbiters in the appointment of the true successor, and having discovered dissimulation and fraud both on the side of Nicomedes, king of Bithynia, and Mithridates, they took away the kingdom of Cappadocia from Mithridates, and Paphlagonia from Nicomedes. This was the first ground of enmity beween Rome and the king of Pontus. (See MITHRIDATICUM BELLUM.) Mithridates then meditated retaliation, and, the more effectually to destroy their power in Asia, he ordered all the Romans that were in his dominions to be massacred. This was done in one night, and no less than 150,000, according to Plutarch, or 80,000 Romans, as Appian mentions, were made, at one blow, the victims of his cruelty. This universal massacre called loud for revenge. Aquilius, and soon after Sylla, marched against Mithridates with a large army. The former was made prisoner, but Sylla obtained a victory over the king's generals, and another decisive engagement rendered him master of all Greece, Macedonia, Ionia, and Asia Minor, which had submitted to the victorious arms of the monarch of Pontus. Mithridates, weakened by repeated ill success by sea and land, then sued for peace, which he obtained, on condition of defraying the expences which the Romans had incurred by the war, and of remaining satisfied with the possessions which he had received from his ancestors. While these negociations of peace were carried on, Mithridates was not unmindful of his real interest. His poverty, and not his inclinations, obliged him to wish for peace. He, however, shortly after took the field with an army of 140,000 infantry, and 16,000 horse; and Lucullus, the consul, marched into Asia, and without delay blocked up the camp of Mithridates, who was then besieging Cyzicus. The Asiatic monarch escaped from him, and fled into the heart of his kingdom. The appointment of Glabrio to the command of the Roman forces instead of Lucullus was favourable to Mithridates, and he recovered the greatest part of his dominions. The sudden arrival of Pompey, however, soon put an end to his victories. A battle, in the night, was fought near the Euphrates, in which an universal overthrow ensued, and Mithridates, bold in his misfortunes, rushed through the thick ranks of the enemy, at the head of 800 horsemen, 500 of which perished in the attempt to follow him. He fled to Tigranes, but that monarch refused an asylum to his father-in-law, whom he had before supported with all the collected forces of his kingdom. Mithridates, however, found a safe retreat among the Scythians. His subjects, at last, refused to follow him any longer, and they revolted from him, and made his son Pharnaces king. The son showed himself ungrateful to his father. This broke the heart of Mithridates; he obliged his wife Monime to poison herself, and attempted to do the same himself; but the frequent antidotes he had taken in the early part of his life strengthened his constitution against the poison, and, when this was unavailing, he attempted to stab himself. The blow was not mortal, and a Gaul, who was then present, at his own request, gave him the fatal stroke, about 63 years B. C. in the 72d year of his age. Such were the misfortunes, abilities, and miserable end of a man, who supported himself so long against the power of Rome. Mithridates has been commended for his eminent virtues, and censured for his vices. He was the greatest monarch that ever sat on a throne, according to the opinion of Cicero. His skill in physic is well known, and even now there is a celebrated antidote which bears his name, and is called Mithridate. The conduct of Mithridates to his wife has given birth to a fine tragedy, that of Monimia, in the earl of Carysfort's dramatic and narrative poems, recently published. This name is common also to other kings in Armenia, Pergamus, Pontus and Parthia.

MITHRIDATICUM BELLUM, begun 89 years B. C. was one of the longest and most celebrated wars ever carried on by the Romans against a foreign power. The ambition of Mithridates VII. king of Pontus, from whom it receives its name, may be called the cause and origin of it. His views upon the kingdom of Cappadocia, of which he was stripped by the Romans, first engaged him to take up arms against the republic. (Vid. MITHRIDATES.) According to Justin, Orosius, Florus, and Eutropius, it lasted for 40 years; but the opinion of others, who fix its duration to 30 years, is far more credible; and upon proper calculation, there elapsed no more than 26 years from the time that Mithridates first entered the field against the Romans till the time of his death.

MITIGANT. *a.* (*mitigans*, Lat.) Lenient; lenitive.

To MITIGATE. *v. a.* (*mitigo*, Latin.) 1. To soften; to make less rigorous (*Hooker*). 2. To alleviate; to make mild (*Hooker*). 3. To mollify; to make less severe (*Milton*). 4. To cool; to moderate (*Addison*.)

MITIGATION. *s.* (*mitigatio*, Lat.) Abatement of any thing penal, harsh, or painful (*Bacon*).

MITRA, a cap or cover worn by the Roman ladies.

MITRAL VALVES. *Valvulæ mitrales.* In anatomy, the valves of the left ventricle of the heart are so called from their resemblance to a mitre.

MITRE, in helminthology. See VOLUTA.

MITRE, MITRA, from μιτρα, which signifies the same; a pontifical ornament, worn on the head by bishops, and certain abbots, on solemn occasions.

The mitre is a round cap, pointed, and cleft at top, with two pendants hanging down on the shoulders, and fringed at both ends. The bishop's is only surrounded with a fillet of gold, set with precious stones; the archbishop's issues out of a ducal coronet. These are never used otherwise than on their coats of arms. Abbots wear the mitre turned in profile, and bear the crosier inwards, to shew that they have no spiritual jurisdiction without their own cloisters.

The pope has also granted to some canons of cathedrals the privilege of wearing the mitre. The counts of Lyons are also said to have assisted at church in mitres.

In Germany several great families bear the mitre for their crest; to shew that they are advocates, or feudatories, of ancient abbeys, or officers of bishops, &c.

The pope has four mitres, which are more or less rich, according to the solemnity of the feast-days they are to be worn on. The mitre was originally the women's head-dress, as the hat was that of the men. This appears from Remulus in Virgil, who reproaches the Trojans, that they were dressed like women, and wore mitres. *Et tunicæ manicas et habent redimicula mitræ.*

The cardinals anciently wore mitres, before the hat, which was first granted them by the council of Lyons, in 1243. Authors make no mention of the mitre as an episcopal ornament before the year 1000.

MITRE, in architecture, is the workmen's term for an angle that is just 45 degrees, or half a right one.

If the angle be a quarter of a right angle, they call it a half-mitre.

MITRE is used by the writers of the Irish history for a sort of base money, which was very common there about the year 1270, and for 30 years before, and as many after. There were beside the mitre several other pieces called according to the figures impressed upon them, rosaries, lionades, eagles, and by the like names. They were imported from France and other countries, and were so much below the proper currency of the kingdom, that they were not worth so much as a halfpenny each. They were at length decried in the year 1300, and good coins struck in their place.

MITRED. *a.* (*mitré*, French, from *mitre.*) Adorned with a mitre (*Prior*).

MITTAU, the capital of the duchy of Courland. It is strongly fortified; but was taken by the Swedes in 1701, and by the Muscovites in 1706. Lon. 23. 51 E. Lat. 56. 44 N.

MITTENT. *a.* (*mittens*, Latin.) Sending forth; emitting (*Wiseman*).

MITTENS. *s.* (*mitains*, French.) 1. Coarse gloves for the winter (*Peacham*). 2. Gloves that cover the arms without covering the fingers.

MITTIMUS, as generally used, hath two significations. 1. It signifies a writ for removing or transferring of records from one court to another. 2. It signifies a precept, or command in writing, under the hand and seal of a justice of the peace, directed to the gaoler or keeper of some prison, for the receiving and safe keeping of an offender charged with any crime until he be delivered by due course of law.

MITYLENE, or MYTELENE (anc. geog.), a celebrated, powerful, and affluent city, capital of the island of Lesbos. It receives its name from Mitylene, the daughter of Macareus, a king of the country. It is greatly commended by the ancients for the stateliness of its buildings and the fruitfulness of its soil, but more particularly for the great men it produced. Pittacus, Alcæus, Sappho, Terpander, Theophanes, Hellanicus, &c. were all natives of Mitylene. It was long a seat of learning; and with Rhodes and Athens it had the honour of having educated many of the great men of Rome and Greece. In the Peloponnesian war, the Mityleneans suffered greatly for their revolt from the power of Athens; and in the Mithridatic wars they had the boldness to resist the Romans, and disdain the treaties which had been made betwen Mithridates and Sylla.

To MIX. *v. a.* (*misceo*, Latin.) 1. To unite to something else (*Hosea*). 2. To unite various ingredients into one mass (*Esdras*). 3. To form of different substances (*Bacon*) 4. To join; to mingle (*Shakspeare*).

To MIX. *v. n.* To be united into one mass by mutual intromission of parts (*Milton*).

MIXEN. *s.* (mixen, Saxon.) A dunghill; a laystall.

MIXO-LYDIAN. (Greek.) The name of one of the modes in the ancient music, called also hyper-dorian. The mixo-lydian mode was the most acute of the seven to which Ptolemy reduced the Greek music.

MIXTION. *s.* (*mixtion*, French.) Mixture; confusion of one thing with another (*Digby*).

MIXTLY. *ad.* (from *mix.*) With coalition of different parts into one.

MIXTURE, *s.* (*mixtura*, Latin.) 1. The act of mixing; the state of being mixed (*Arbuthnot*). 2. A mass formed by mingled ingredients. 3. That which is added and mixed (*Addison*).

MIXTURE, a compound or assemblage of several different bodies in the same mass. Simple mixture consists only in the simple apposition of parts of different bodies to each other. Thus, when powders of different kinds are rubbed together the mixture is only simple, and each of the powders retains its particular character. In like manner, when oil and water are mixed together, though the parts of both are confounded, so that the liquor may appear to be homogeneous, we cannot say that there is any more than a simple apposition of the parts, as the oil and water may very easily be again separated from each other. But the case is very different when bodies are chemically mixed; for then one or both bodies assume new properties, and can by no means be discovered in their proper form without a particular chemical process adapted to this purpose.

Hence chemical mixture is attended with many phenomena which are never observed in simple mixtures; such as heat, effervescence, &c.

MIZEN. See MISEN.

MIZZY. *s.* A bog; a quagmire (*Ains.*).

MNASIUM, in botany, a genus of the class hexandria, order monogynia. Spathe two-valved, many flowered: calyx three-parted; corol one-petalled, three-toothed, with a very short tube; anthers terminated by a leaflet; stigmas three, spirally twisted. One species only, an aquatic plant of Guiana, with involucred, panicled, yellow flowers.

MNEMO'NICKS. *s.* (μνημονικη.) The art of memory.

MNEMOSYNE (fab. hist.), a daughter of Cœlus and Terra. She married Jupiter, by whom she had the nine Muses. The word Mnemosyne signifies "memory;" and therefore the poets have rightly called Memory the mother of the Muses, because it is to that mental endowment that mankind are indebted for their progress in science.

MNIARUM, in botany, a genus of the class monandria, order digynia. Calyx four-parted, superior; corolless; seed one. One species only; a New Zealand herb, with subsessile flowers terminating in pairs.

MNIUM. Marsh-moss. In botany, a genus of the cryptogamia musci class and order. Natural order of mosses. Generic character: capsule with a lid; calyptre smooth; bristle from a terminating tubercle: male flowers headed, or discoid. Twenty species are enumerated, among which M. hygrometricum is the most remarkable. If the fruit stalk be moistened at the bottom, the head makes three or four turns; and if the head be moistened it turns the contrary way. By some authors this is ranged with the Bryums; and Hedwig makes it a Koelreuteria.

MO *a.* (ma, Saxon.) Making greater number: more: obsolete. (*Spenser*).

MO. *ad.* Further; longer: obsolete. (*Shaks.*)

MOAB (anc. geog.), a country of Arabia Petræa; so called from Moab the son of Lot, to whose posterity this country was allotted by divine appointment, Deut. xi. 9. It was originally occupied by the Emim, a race of giants extirpated by the Moabites, *ibid.* Moab anciently lay to the south of Ammon, before Sihon the Amorite stripped both nations of a part of their territory, afterwards occupied by the Israelites, Numb. xxi.; and then Moab was bounded by the river Arnon to the north, the Lacus Asphaltites to the west, the brook Zared to the south, and the mountains Abarim to the east.

To MOAN. *v. a.* (from mænan, Saxon, to grieve.) To lament; to deplore.

To MOAN. *v. n.* To grieve, to make lamentation (*Thomson*).

MOAN. *s.* Lamentation; audible sorrow (*Shakspeare*).

MOAT. *s.* (*motte*, French.) A canal of water round a house or castle for defence (*Sid.*).

To MOAT. *v. a.* (*motter*, French.) To surround with canals by way of defence (*Dry.*).

MOAT, or DITCH, in fortification, a deep trench dug round the rampart of a fortified place to prevent surprises.

The brink of the moat, next the rampart, is called the scarp; and the opposite one, the counterscarp. A dry moat round a large place, with a strong garrison, is preferable to one full of water; because the passage may be disputed inch by inch, and the besiegers, when lodged in it, are continually exposed to the bombs, granades, and other fire-works, which are thrown in incessantly from the rampart into their works. In the middle of dry moats there is sometimes another small one called cunette, which is generally dug so deep till they find water to fill it. The deepest and broadest moats are accounted the best, but a deep one is preferable to a broad one: the ordinary breadth is about twenty fathoms, and the depth about sixteen.

To drain a moat that is full of water, they dig a trench deeper than the level of the water to let it run off, and then throw hurdles upon the mud and slime, covering them with earth or bundles of rushes, to make a sure and firm passage.

MOB. *s.* (from *mob-le.*) A kind of female undress for the head.

MOB. *s.* (contracted from *mobile* Latin.) The crowd; a tumultuous rout (*Dryden*).

To MOB. *v. a.* (from the noun) To harass, or overbear by tumult

MO'BBISH. *a.* (from *mob.*) Mean; done after the manner of the mob.

MO'BBY. *s.* An American drink made of potatoes.

MO'BILE. *s.* (*mobile*, French.) The populace; the rout; the mob (*L'Estrange*).

MOBILE, moveable, any thing susceptible of motion, or that is disposed to be moved either by itself or by some other prior mobile, or mover.

MOBILE (Primum), in the ancient astronomy, was a ninth heaven, or sphere, imagined above those of the planets and fixed stars.

This was supposed to be the first mover, and to carry all the lower spheres round along with it; by its rapidity communicating to them a motion whereby they revolved in twenty-four hours. But the diurnal revolution of the planets is now accounted for, without the assistance of any such *primum mobile*.

MOBILES, in the ancient music, was an appellation given to the two intermediate chords of a tetrachord; because their variations produced the different genera and species of music. They were called by the Greeks κινουμενοι, or κινημενοι.

MOBI'LITY. *s.* (*mobilité*, Fr. *mobilitas*, Latin.) 1. The power of being moved (*Locke*). 2. Nimbleness; activity (*Blackmore*). 3. (In cant language.) The populace (*Dryden*). 4. Fickleness; inconstancy (*Ainsworth*).

To MO'BEL. *v. a.* To dress grossly or inelegantly (*Shakspeare*).

MOCHLICA, a term given by some authors to drastic purges.

MOCHA-STONE, in mineralogy. See CHALCEDONIUS. The term is a corruption from the German *moch-stein*, or moss-stone.

MOCHA, or MOKA, a considerable town of Arabia Felix, surrounded by walls. It carries on a great trade, especially in coffee; and the inhabitants are computed at 10,000, without including the poor Armenians, or the Jews, who inhabit the suburbs. The women, except a small number of the common sort, never appear in the streets in the day time, but visit each other in the evening. When they meet any men in the way, they stand up close against the wall to let them pass. Their dress is much like other women of the East, and over all they wear a large veil of painted calico, so thin that they can see through it without being seen. They have also little buskins of Morocco leather. The English at present engross almost exclusively the trade of this place: the Portuguese having long since ceased to send any ships hither, and the Dutch rarely sending any. Mocha is seated in a sandy country, near the straits of Babelmandel, 240 miles S.S.W. of Sanaa, and 560 S.S.E. of Mecca. Lon. 44. 25 E. Lat. 14. 0 N.

To MOCK. *v. a.* (*mocquer*, French.) 1. To deride; to laugh at; to ridicule (*Job*). 2. To deride by imitation; to mimic in contempt (*Shakspeare*). 3. To defeat; to elude (*Shaks*). 4. To fool; to tantalize; to play on contemptuously (*Milton*).

To MOCK. *v. n.* To make contemptuous sport (*Job*).

MOCK. *s.* (from the verb.) 1. Ridicule; act of contempt; sneer; gibe; flirt (*Tillotson*). 2. Imitation; mimickry (*Crashaw*).

MOCK *a.* False; counterfeit; not real (*Dryden*).

MOCK-ORANGE, in botany. See PHILADELPHUS.

MOCK-PRIVET. See PHILLYNEAS.

MOCKABLE. *a.* Exposed to derision (*Shakspeare*).

MO'CKEL. *a* (the same with *mickle*.) Much, many (*Spenser*).

MO'CKER. *s.* (from *mock*.) 1. One who mocks; a scorner; a scoffer (*Shakspeare*). 2. A deceiver; and elusory impostor.

MO'CKERY. *s.* (*mocquerie*, French.) 1. Derision; scorn; sportive insult (*Watts*). 2. Ridicule; contemptuous merriment (*Hook*). 3. Sport; subject of laughter (*Shakspeare*). 4. Vanity of attempt; vain effort (*Shaks.*). 5. Imitation; counterfeit appearance; vain show (*Shakspeare*).

MOCKING-BIRD, in ornithology. See ORIOLUS and TURDUS.

MO'CKINGLY. *ad.* (from *mockery*). In contempt; petulantly; with insult.

MO'CKING-STOCK. *s.* (*mocking* and *stock*). A butt for merriment.

MO'DAL. *a* (*modale*, French.) Relating to the form or mode, not the essence (*Glan.*).

MODA'LITY. *s.* (from *modal*.) Accidental difference; modal accident (*Holder*).

MODBURY, a town in Devonshire, with a market on Thursday. It is seated in a bottom, between two hills, 36 miles S.S.W. of Exeter, and 208 W.S.W. of London. Lon. 3. 54 W. Lat. 50. 23 N.

MODE. *s.* (*mode*, French; *modus*, Latin) 1. External variety; accidental discrimination; accident (*Watts*). 2. Gradation; degree (*Pope*). 3. Manner; method; form; fashion (*Taylor*). 4. State; quality (*Shakspeare*). 5. Fashion; custom (*Addison*).

MODE, in grammar. See GRAMMAR.

MODE, or MOOD, (*modus*), in philosophy, a manner of being, or a quality or attribute of a substance, or subject, which we conceive as necessarily depending on the subject, and incapable of subsisting without it.

Mr Locke defines modes to be those ideas (he should have said things) which do not imply any supposition of subsisting by themselves, but are considered as mere dependences, and affections of substances.

Our ideas of things may be reduced to two kinds: the one of things, which we conceive separately, and by themselves, called substances; and the other of things which we conceive as existing in others, in such manner as that we cannot allow them existing without them, and these we call modes or accidents.

It is the characteristic, then, of a true mode to have such a relation to some subject, as not to be clearly and distinctly conceivable without conceiving the subject, whereof it is a mode, at the same time: when, on the other hand, the conception of the subject does not at all infer or require that of the mode.

Thus what gives us to know, that thought is not a mode of extended substance, or matter, is, that extension, and the other properties of matter, may be divided from thought, without ceasing to conceive thought all the while.

We always consider things as clothed with certain modes, except we reflect on them in the abstract, or general: and it is the variety of modes, and the relations, that occasions the great variety of denominations of the same thing. They are the various modes of matter, e. g. that make all the diversity of bodies, or corporeal beings, in nature.

There are various divisions and kinds of modes: as, 1. Essential or accidental. An essential mode, or attribute, is that which belongs to the very nature or essence of the subject wherein it is: and the subject can never have the same nature without it, as roundness in a bowl, solidity in matter, thinking in a spirit, &c. and this is primary, when it is the first or chief thing that constitutes any being in its particular essence or nature, and makes it to be that which it is, and distinguishes it from all other beings, as roundness in a bowl; or secondary, which is any other attribute of a thing, that is not of primary consideration, called a property; as volubility in a bowl. An accidental mode, or accident; is such a mode as is not necessary to the being of a thing; for the subject may be without it, and yet remain of the same nature which it had before; or it is that mode, which may be separated from its subject; as, blackness or whiteness in a bowl, learning in a man, &c.

2. Modes are absolute and relative. An absolute mode is that which belongs to its subject, without respect to any other beings whatsoever. A relative mode is derived from the regard which one being has to others: thus, roundness and

smoothness are the absolute modes of a bowl; but greatness and smallness are relative. See REGULATION.

3. Modes are intrinsical or extrinsical. The former are conceived to be in the subject or substance; as when we say a globe is round, &c. The latter mode is a manner of being which some substances attain by reason of something that is external or foreign to the subject, and is called external denomination; as, this globe lies within two yards of the wall, &c.

4. Modes are also inherent or adherent, i. e. proper or improper. Adherent modes arise from the joining of some accidental substance to the chief subject, which yet may be separated from it; as when a bowl is wet, &c. Inherent modes have a sort of in-being in the substance itself; as, the bowl is swift or round, &c.

5. Action and passion, using the terms in a philosophical sense, are modes which belong to substances; as, when a smith with a hammer strikes a piece of iron, the smith and hammer are agents or subjects of action, and the iron is the patient or subject of passion.

6. Modes may be divided into natural, civil, moral, and supernatural, all which pertain to the apostle Paul, who was a little man, a Roman by the privilege of his birth, a man of virtue or honesty, and an inspired apostle.

7. Modes belong either to body, or to spirit, or to both. Modes of body belong only to matter, or to corporeal beings; such are figure, rest, motion, &c. These are primary, when they belong to bodies, considered in themselves, whether there were any man to take notice of them or no, as shape, size, &c. or secondary, which are such ideas as we ascribe to bodies on account of the various impressions that are made on the senses of men by them, called secondary qualities; such are all colours, sounds, tastes, smells, and all tactile qualities. (See QUALITY.) Modes of spirit belong only to minds, such are knowledge, will, &c. Modes belonging to body and spirit are called mixed or human modes, because they are found in human nature, such are sensation, imagination, passion, &c. in which there is a concurrence of the operation of animal and intellectual nature.

8. There are also modes of other modes, which, though they subsist in and by the substance, as the original subject of them, are properly and directly attributed to some mode of that substance; thus, swiftness and slowness are modes of motion, which is itself the mode of a body.

MODE, in music, the particular order of the concinnous degrees of an octave, the fundamental note whereof may be called the key, as it signifies that principal note which regulates the rest. The proper difference, therefore, between a mode and a key is this, that an octave with all natural and concinnous degrees is called a mode, with respect to the constitution or manner of dividing it; and with respect to its place in the scale it is called a key.

There is this difference between the mode and the tone, that the latter only determines the principal sound, and indicates the place which is most proper to be occupied by that system which ought to constitute the bass of the air; whereas the former regulates the thirds, and modifies the whole scale agreeably to its fundamental sounds.

Sir Francis Haskins Eyles Styles, in an elaborate essay on the modes of the ancients, Phil. Trans. vol. li. 695, has undertaken to prove that the two doctrines on this subject, which he distinguishes by the epithets of harmonic and musical, and which have been advanced by different writers, are in reality the same. According to one of these, viz. the harmonic, the difference between one mode and another consisted in the tension or pitch of the system; and, according to the other, or musical, this difference consisted in the manner of dividing an octave, or in the different species of the diapason: but both these definitions of a musical mode perfectly coincide. This author observes, that, according to the harmonic doctrine, the numbers of the modes had been augmented to fifteen; but Ptolemy, who appears to have favoured the musical, reduces them to seven: of these seven, according to the direction furnished by Bacchius, p. 12. ed Meibom. it appears, that the Mixolydian was the most acute; the Lydian graver by a semitone; the Phrygian graver than the Lydian by a tone; the Dorian graver than the Phrygian by a tone; the Hypolydian graver than the Dorian by a semitone; the Hypophrygian graver than the Hypolydian by a tone; and the Hypodorian graver than the Hypophrygian by a tone. Now as the Guidonian scale, in use among the moderns, answers to the system of the ancients in its natural situation, which was in the Dorian mode, and our A la mi re, consequently, answers to the pitch of the Dorian mese: we have a plain direction for finding the absolute pitch of the meses for all the seven in our modern notes, and they will be found to stand thus:

Mixolydian mese in	*d*
Lydian in	*c sharp*
Phrygian in	*b*
Dorian in	*a*
Hypolydian in	*g sharp*
Hypophrygian in	*f sharp*
Hypodorian in	*e*

But to understand this doctrine as delivered by the ancients, it will be necessary also to examine how the meses of the seven modes were stationed upon the lyre. The lyre, after its last enlargements, consisted of fifteen strings, which took in the compass of a dis-diapason, or double octave. These strings were called by the same names as the fifteen sounds of the system; and, when tuned for the Dorian mode, corresponded exactly with them. In this mode the mese of the system was placed in the mese of the lyre; but in every one of the rest, it was applied to a different string, and every sound of the system transposed accordingly. Hence arose the distinction between a sound in power and a sound in position; for when the system was transposed from the Dorian to any other mode, e. g. to the Phrygian, the mese of the lyre, though still mese in position, acquired in this case the power of the lichanos meson; and the paramese of the lyre, though still paramese in position, acquired the power of the mese. In these transpositions one or more of the strings always required new tunings, to preserve the relations of the system; but, notwithstanding this alteration of their pitch, they retained their old names, when spoken of, in respect to their positions only; for the name implied not any particular pitch of the string, but only its place upon the lyre, in the numerical order, reckoning the proslambanomenos for the first. The places of the mese for the seven modes upon the lyre are settled by Ptolemy as follow:

		string.
Mixolydian	Paranetediezeugmenon	11
Lydian	Tritediezeugmenon	10
Phrygian	Paramese	9
Dorian	Mese in	Mese	8
Hypolydian	Lichanos meson	7
Hypophrygian	Parhypate meson	6
Hypodorian	Hypate meson	5

On the other hand, the musical doctrine taught, that the difference between one mode and another consisted in the manner of dividing an octave, or in the different species of diapason. These were, as we have already observed, seven in number; and had the denominations of Mixolydian, Lydian, Phrygian, Dorian, Hypolydian, Hypophrygian, and Hypodorian. See DIAPASON.

These species, as they stand in the system, are with respect to acuteness and gravity in the inverted order of the seven modes as settled by the harmonic doctrine. According to the Guidonian scale, and preserving the natural notes, they will stand in the manner represented under diapason.

The order of the intervals of which each species is composed, proceeding in each from grave to acute, will be as follows:

Mixolydian. Semitone, tone, tone, semitone, tone, tone, tone.

Lydian. Tone, tone, semitone, tone, tone, tone, semitone.

Phrygian. Tone, semitone, tone, tone, tone, semitone, tone.

Dorian. Semitone, tone, tone, tone, semitone, tone, tone.

Hypolydian. Tone, tone, tone, semitone, tone, tone, semitone.

Hypophrygian. Tone, tone, semitone, tone, tone, semitone, tone.

Hypodorian. Tone, semitone, tone, tone, semitone, tone, tone.

The ancients had another method of explaining the species of diapason by the position of the diazeuctic tone, or interval from mese to paramese. In the Mixolydian species, the diazeuctic tone was the first interval, reckoning from acute to grave; in the Lydian it was the second; in the Phrygian the third; in the Dorian the fourth; in the Hypolydian the fifth; in the Hypophrygian the sixth; and in the Hypodorian the last.

The ancient modes, besides their general division into authentic and plagal, had also their respective names from the several Greek provinces where they are supposed to have been invented. Originally indeed there were but three, viz. Doric, Lydian, and Phrygian; which were particularly called tones, because at a tone's distance from one another. The rest were added afterwards, and were some of them named from the relations they bore to the former, particularly the Hypo-doric, as being below the Doric. See the preceding part of this article.

The Doric mode was a mixture of gravity and mirth, invented by Thamyras of Thrace.

The Phrygian mode was adapted to the kindling of rage; and was invented by Marsyas the Phrygian.

The Lydian mode was proper for amorous or funeral songs; and was invented, according to Pliny, by Amphion.

The Mixolydian was invented by Sappho. The Æolic, Ionic, and Hypo-dorian by Philoxenus. And the Hypolydian by Polymnestes. See DORIC, &c.

Besides these modes of tune, old authors have also introduced modes of time, or measures of notes. These at first were distinguished into greater and less, and each of these again into perfect and imperfect. But afterwards they reduced all into our four modes, which included the whole business of time. These modes are now disused.

Our modes are not, like those of the ancients, characterised by any sentiment which they tend to excite, but result from our system of harmony alone. The sounds essential to the mode are in number three, and form together one perfect chord. 1. The tonic or key, which is the fundamental note both of the tone and of the mode. (See TONE and TONIC.) 2. The dominant, which is a fifth from the tonic. (See DOMINANT.) 3. The mediant, which properly constitutes the mode, and which is a third from the same tonic. As this third may be of two kinds, there are of consequence two different modes. When the mediant forms a greater third with the tonic, the mode is major; when the third is lesser, it is minor.

The major mode is immediately generated by the resonance of sounding bodies, which exhibit the third major of the fundamental sound: but the minor mode is not the product of nature; it is only found by analogy and inversion. This is equally true upon the system of Sig. Tartini, as upon that of M. Rameau.

When the mode is once determined, every note in the scale assumes a name expressive of its relation to the fundamental sound, and peculiar to the place which it occupies in that particular mode. We subjoin the names of all the notes significant of their relative values and places in each particular mode, taking the octave of *ut* as an example of the major mode, and of *la* as an example of the minor.

Major,	*ut*	*re*	*mi*	*fa*	*sol*	*la*	*si*	*ut*,
Minor,	*la*	*si*	*ut*	*re*	*mi*	*fa*	*sol*	*la*:
	Tonic.	Second note.	Mediant.	Sub-dominant. Fourth note, or	Dominant.	Sub-dominant. Sixth note, or	Seventh note.	Octave.

It is necessary to remark, that when the seventh note is only a semitone distant from the highest in the octave, that is to say, when it forms a third major with the dominant, as *si* natural in the major mode, or *sol* sharp in the minor, that seventh sound is then called a sensible note, because it discovers the tonic and renders the tone appreciable.

Nor does each gradation only assume that name which is suitable to it; but the nature of each interval is determined according to its relation to the mode. The rules established for this are as follow:

1. The second note must form a second major above the tonic, the fourth note and the dominant should form a fourth and fifth exactly true; and this equally in both modes.

2. In the major mode, the mediant or third, the sixth and the seventh from the tonic, should always be major; for by this the mode is characterised. For the same reason these three intervals ought always to be minor in the minor mode: nevertheless, as it is necessary that the sensible note should likewise there be perceived, which can-

not be effectuated without a false relation whilst the sixth note still remains minor; this occasions exceptions, of which in the course of the air or harmony care must be taken. But it is always necesary that the cleff, with its transpositions, should preserve all the intervals, as determined with relation to the tonic, according to the species of the mode.

As all the natural chords in the octave of *ut* give, with relation to that tonic, all the intervals prescribed for the major mode, and as the case is the same with the octave of *la* for the minor mode, the preceding example, which is only given that we might have an opportunity of naming the notes, may likewise serve as a formula for the rule of the intervals in each mode.

This rule is not, as one might imagine, established upon principles that are merely arbitrary; it has its source in the generation of harmony: at least in a certain degree. If you give a perfect major chord to the tonic, to the dominant, and the sub-dominant, you will have all the sounds of the diatonic scale for the major mode: to obtain that of the minor, leaving still its third major to the dominant, give a third minor to the two other chords. Such is the analogy of the mode.

As this mixture of major and minor chords introduces into the minor mode a false relation between the sixth and the sensible note, to avoid this false relation they sometimes give the third major to the fourth note in ascent, or the third minor to the dominant in descending, chiefly by inverting the chords; but these in this case are licences.

There are properly no more than two modes, as we have seen: but there are twelve different sounds in the octave, which may be made fundamental sounds, and of consequence form as many keys or tones; and as each of these tones is susceptible of the major or minor mode, music may be composed in twenty-four modes or manners. Nay, in the manner of writing music, there are even thirty-four passable modes: but in practice ten are excluded; which when thoroughly examined are nothing else but a repetition of the other ten, under relations much more difficult, in which all the chords must change their names, and where it must cost any one some trouble to know what he is about. Such is the major mode upon a note raised above its natural pitch by a semitone, and the minor mode upon a note depressed by a semitone. Thus instead of composing upon *sol* sharp with a third major, it is much more eligible to operate upon *la* flat, which will give you an opportunity to employ the same tones; and instead of composing upon *re* flat with a third minor, you will find it more convenient to choose *ut* sharp for the same reason; viz. on one hand to avoid a *fa* with a double sharp, which would be equivalent to a *sol* natural; and on the other hand a *si* with a double flat, which would become a *la* natural.

The composer does not always continue in the same mode, nor in the same key, in which he has begun an air; but, whether to alter the expression or introduce variety, modes and keys are frequently changed, according to the analogy of harmony; yet always returning to those which have been first heard: this is called modulation.

From thence arises a new division of modes into such as are principal and such as are relative: the principal is that in which the piece begins and ends; the relative modes are such as the composer interweaves with the principal in the flow of the harmony. See Modulation.

Others have proposed a third species, which they call a mixed mode, because it participates the modulation of both the others, or rather because it is composed of them; a mixture which they did not reckon an inconveniency, but rather an advantage, as it increases the variety, and gives the composer a greater latitude both in air and harmony. The mixed mode, however, is liable to serious objections; on which account we shall say no more respecting it in this place.

MO'DEL. *s.* (*modele*, Fr. *modulus*, Latin.) 1. A representation in little of something made or done (*Addison*). 2. A copy to be imitated (*Hooker*). 3. A mould; any thing which shows or gives the shape of that which it encloses (*Shakspeare*). 4. Standard; that by which any thing is measured (*South*).

To **Model.** *v. a.* (*modeler*, French.) To plan; to shape; to mould; to form; to delineate. (*Addison*).

Model, in a general sense, an original pattern, proposed for any one to copy or imitate. This word is particularly used in building for an artificial pattern made in wood, stone, plaster, or other matter, with all its parts and proportions, in order for the better conducting and executing some great work, and to give an idea of the effect it will have in large. In all great buildings it is much the surest way to make a model in relievo, and not to trust to a bare design or draught. There are also models for the building of ships, &c. and for extraordinary staircases, &c.

They also use models in painting and sculpture; whence, in the academies, they give the term model to a naked man or woman, disposed in several postures, to afford an opportunity to the scholars to design in various views and attitudes.

Models in imitation of any natural or artificial substance, are most usually made by means of moulds composed of plaster of Paris. For the purpose of making these moulds this kind of plaster is much more fit than any other substance, on account of the power it has of absorbing water, and soon condensing into an hard substance, even after it has been rendered so thin as to be of the consistence of cream. This happens in a shorter or longer time, as the plaster is of a better or worse quality; and its good or bad properties depend very much upon its age, to which, therefore, particular regard ought to be had. It is sold in the shops at very different prices; the finest being made use of for casts, and the middling sort for moulds. It may be very easily coloured by means of almost any kind of powder excepting what contains an alkaline salt; for this would chemically decompose the substance of it, and render it unfit for use, the gypsum or plaster being a sulphat of lime, which would be composed by the alkali precipitating the lime. A very considerable quantity of chalk would also render it soft and useless, but lime hardens it to a great degree. The addition of common size will likewise render it much harder than if mere water is made use of. In making either moulds or models, however, we must be careful not to make the mixture too thick at first; for if this is done, and more water added to thin it, the composition must always prove brittle, and of a bad quality.

The particular manner of making models depends on the form of the subject to be taken. The process is easy where the parts are elevated only in a slight degree, or where they form only a right or obtuse angle with the principal surface from which they project; but where the parts project in smaller angles, or form curves inclined towards the principal surface, the work is more difficult. This observation, however, holds good only with regard to hard and inflexible bodies; for such as are soft may often be freed from the mould, even though they have the shape last mentioned. But though this is the case with the soft original substance, it is not so with the inflexible model when once it is cast.

The moulds are to be made of various degrees of thickness, according to the size of the model to be cast; and may be from half an inch to an inch, or, if very large, an inch and a half. Where a number of models are to be taken from one mould, it will likewise be necessary to have it of a stronger contexture than where only a few are required, for very obvious reasons.

It is much more easy to make a mould for any soft substance than a rigid one, as in any of the viscera of the animal body: for the fluidity of the mixture makes it easily accommodate itself to the projecting parts of the substance; and as it is necessary to inflate these substances, they may be very readily extracted again, by letting out the air which distended them.

When a model is to be taken, the surface of the original is first to be greased, in order to prevent the plaster from sticking to it; but if the substance itself is slippery, as is the case with the internal parts of the human body, this need not be done: when necessary, it may be laid over with linseed oil by means of a painter's brush. The original is then to be laid on a smooth table, previously greased, or covered with a cloth, to prevent the plaster sticking to it; then surround the original with a frame or ridge of glazier's putty, at such a distance from it as will admit the plaster to rest upon the table on all sides of the subject for about an inch, or as much as is sufficient to give the proper degree of strength to the mould. A sufficient quantity of plaster is then to be poured as uniformly as possible over the whole substance, until it is every where covered to such a thickness as to give a proper substance to the mould, which may vary in proportion to the size. The whole must then be suffered to remain in this condition till the plaster has attained its hardness: when the frame is taken away, the mould may be inverted, and the subject removed from it; and when the plaster is thoroughly dry, let it be well seasoned.

Having formed and seasoned the moulds, they must next be prepared for the casts by greasing the inside of them with a mixture of olive oil and lard in equal parts, and then filled with fine fluid plaster, and the plane of the mould formed by its resting on the surface of the table, covered to a sufficient thickness with coarse plaster, to form a strong basis or support for the cast, where this support is requisite, as is particularly the case where the thin and membranous parts of the body are to be represented. After the plaster is poured into the mould, it must be suffered to stand until it has acquired the greatest degree of hardness it will receive: after which the mould must be removed: but this is attended with some difficulty when the shape of the subject is unfavourable; and in some cases the mould must be separated by means of a small mallet and chisel. If by these instruments any parts of the model should be broken off, they may be cemented by making the two surfaces to be applied to each other quite wet; then interposing betwixt them a little liquid plaster; and lastly, the joint smoothed, after being thoroughly dry. Any small holes that may be made in the mould can be filled up with liquid plaster, after the sides of them have been thoroughly wetted and smoothed over with the edge of a knife.

In many cases it is altogether impracticable to prepare a mould of one piece for a whole subject; and therefore it must be considered how this can be done in such a manner as to divide the mould into the fewest pieces. This may be effected by making every piece cover as much of the pattern as possible, without surrounding such projecting parts, or running into such hollows as would not admit a separation of the mould. Where any internal pieces are required, they are first to be made; and then the outer pieces, after the former have become hard.

Besides the models which are taken from inanimate bodies, it has been frequently attempted to take the exact resemblance of people while living, by using their face as the original of a model whence to take a mould; and the operation, however disagreeable, has been submitted to by persons of the highest ranks in life. A considerable difficulty occurs in this, however, from the person's being apt to shrink and distort his features when the liquid is poured upon him; neither is he altogether without danger of suffocation, unless the operator well understands his business.

To avoid the former inconvenience, it will be proper to mix the plaster with warm instead of cold water, by which means the person will be under no temptation to shrink; and to prevent any danger of a fatal accident, the following method is to be practised. Having laid he person horizontally on his back, the head must be first raised by means of a pillow to the exact position in which it is naturally carried when the body is erect; then the parts to be represented must be very thinly covered over with fine oil of almonds, by means of a painter's brush: the face is then to be first covered with fine fluid plaster, beginning at the upper part of the forehead, and spreading it over the eyes, which are to be kept close, that the plaster may not come in contact with the globe; yet not closed so strongly as to cause any unnatural wrinkles. Cover then the nose and ears, plugging first up the meatus auditorii with cotton, and the nostrils with a small quantity of tow rolled up, of a proper size to exclude the plaster. During the time that the nose is thus stopped the person is to breathe through the mouth: in this state the fluid plaster is to be brought down low enough to cover the upper lip, observing to leave the rolls of tow projecting out of the plaster. When the operation is thus far carried on, the plaster must be suffered to harden; after which the tow may be withdrawn, and the nostrils left free and open for breathing. The mouth is then to be closed in its natural position, and the plaster brought down to the extremity of the chin. Begin then to cover that part of the breast which is to be represented, and spread the plaster to the outsides of the arms and upwards, in such a manner as to meet and join that which is previously laid on the

face: when the whole of the mass has acquired its due hardness, it is to be cautiously lifted, without breaking or giving pain to the person. After the mould is constructed, it must be seasoned in the manner already directed; and when the mould is cast, it is to be separated from the model by means of a small mallet and chisel. The eyes, which are necessarily shewn closed, are to be carved, so that the eye-lids may be represented in an elevated posture; the nostrils hollowed out, and the back part of the head, from which, on account of the hair, no mould can be taken, must be finished according to the skill of the artist. The edges of the model are then to be neatly smoothed off, and the bust fixed on its pedestal. See also CAST.

MO'DELLER. *s.* (from *model.*) Planner; schemer; contriver (*Spectator*).

MODENA, an ancient city of Italy, capital of the Modenese, with a bishop's see. The cathedral, several of the churches, and some of the monasteries are handsome structures; and the ducal palace is richly furnished, and contains fine paintings. The citadel has been often taken, particularly by the king of Sardinia, in 1742. The inhabitants are said to be 40,000; and they make here the best masks for masquerades in all Italy. It is seated between the rivers Secchia and Panaro, 22 miles W. by N. of Bologna, 34 S. by E. of Mantua, and 60 N.N.W. of Florence. Lon. 11. 0 E. Lat. 44. 34 N.

MODENA, or MODENESE, a duchy of Italy, 50 miles long and 40 broad; bounded on the W. by that of Parma, on the N. by the duchies of Mantua and Mirandola, on the E. by the Bolognese and Ferrarese, and on the S. by Tuscany and the republic of Lucca. The soil is very fertile in corn, wine, oil, and fruits of different kinds. It also feeds a great number of cattle.

MO'DERATE. *a.* (*moderatus*, Latin.) 1. Temperate; not excessive (*Ecclus.*) 2. Not hot of temper (*Swift*). 3. Not luxurious; not expensive (*Shakspeare*). 4. Not extreme in opinion; not sanguine in a tenet (*Smalridge*). 5. Placed between extremes; holding the mean (*Hooker*). 6. Of the middle rate (*Dryden*).

To MO'DERATE. *v. a.* (*moderor*, Latin.) 1. To regulate; to restrain; to still; to pacify; to quiet; to repress (*Spenser*). 2. To make temperate; to qualify (*Blackman*).

MO'DERATELY. *ad.* (from *moderate.*) 1. Temperately; mildly. 2. In a middle degree (*Waller*).

MO'DERATENESS. *s.* (from *moderate.*) State of being moderate; temperateness.

MODERA'TION. *s.* (*moderatio*, Latin.) 1. Forbearance of extremity; the contrary temper to party violence; state of keeping a due mean between extremes (*Atterbury*). 2. Calmness of mind; equanimity (*Milton*). 3. Frugality in expence (*Ainsworth*).

MODERA'TOR. *s.* (*moderator*, Latin.) 1. The person or thing that calms or restrains (*Walton*). 2. One who presides in a disputation, to restrain the parties from indecency, and confine them to the question (*Bacon*).

MO'DERN. *a.* (*moderne*, French.) 1. Late; recent; not ancient; not antique (*Bacon. Prior*). 2. In *Shakspeare*, vulgar; mean; common.

MO'DERNS. *s.* Those who have lived lately, opposed to the ancients (*Boyle*).

To MO'DERNISE. *v. a.* To adapt ancient compositions to modern persons or things.

MO'DERNISM. *s.* Deviation from the ancient and classical manner (*Swift*).

MO'DERNNESS. *s.* (from *modern.*) Novelty.

MO'DEST. *a.* (*modeste*, French.) 1. Not arrogant; not presumptuous (*Young*). 2. Not impudent; not forward (*Dryden*). 3. Not loose; not unchaste (*Shakspeare*). 4. Not excessive; not extreme (*Addison*).

MO'DESTLY. *ad.* (from *modest.*) 1. Not arrogantly; not presumptuously (*Swift*). 2. Not impudently; not forwardly; with respect (*Shakspeare*). 3. Not loosely; not lewdly; with decency. 4. Not excessively; with moderation.

MO'DESTY. *s.* (*modestie*, Fr. *modestas*, Lat.) 1 Not arrogance; not presumptuousness. 2. Not impudence; not forwardness. 3. Moderation; decency (*Shakspeare*). 4. Chastity; purity of manners (*Dryden*).

MODESTY, in ethics, is sometimes used to denote humility; and sometimes to express chastity, or purity of sentiments and manners. Modesty, in this last sense, and as particularly applied to women, is defined by the authors of the Encyclopédie Methodique, as a natural, chary, and honest shame; a secret fear; a feeling on account of what may be accompanied with disgrace. Women who possess only the remains of a suspicious modesty, make but feeble efforts to resist: those who have obliterated every trace of modesty from their countenance, soon extinguish it completely in the soul, and throw aside for ever the veil of decency. She, on the contrary, who truly possesses modesty, passes over in silence attempts against her honour, and forbears speaking of those from whom she has received an outrage, when in doing so she must reveal actions and expressions that might give alarm to virtue.

The idea of modesty is not a chimera, a popular prejudice, or an illusion arising from laws and education. Nature, which speaks the same language to all men, has, with the unanimous consent of nations, annexed contempt to female incontinence. To resist and to attack are laws of her appointment: and while she bestows desires on both parties, they are in the one accompanied with boldness, in the other with shame. To individuals she has allotted long spaces of time for the purposes of self-preservation, and but moments for the propagation of their species. What arms more gentle than modesty could she have put into the hands of that sex which she designed to make resistance!

If it were the custom for both sexes to make and receive advances indiscriminately, vain importunity would not be prevented: the fire of passion would never be stirred up, but languish

in tedious liberty; the most amiable of all feelings would scarcely warm the human breast; its object would with difficulty be attained. That obstacle, which seems to remove this object to a distance, in fact brings it nearer. The veil of shame only makes the desires more attractive. Modesty kindles that flame which it endeavours to suppress: its fears, its evasions, its cautions, its timid avowals, its pleasing and affecting finesses, speak more plainly what it wishes to conceal than passion can do without it: it is modesty, in short, which enhances the value of a favour, and mitigates the pain of a refusal.

Mo'desty-piece. *s.* A narrow lace which runs along the upper part of the stays before, being part of the tucker (*Addison*).

MODICA, a town of Sicily, in Val-di-Noto, on a river of the same name, 25 miles S.W. of Syracuse. Lon. 15. 9 E. Lat. 36. 48 N.

MO'DICUM. *s.* (Latin.) Small portion; pittance (*Dryden*).

MO'DIFIABLE. *a.* (from *modify.*) That may be diversified by accidental differences (*Locke*).

MO'DIFICABLE. *a.* (from *modify.*) Diversifiable by various modes.

MODIFICATION. *s.* (*modification*, Fr.) The act of modifying any thing, or giving it new accidental differences of external qualities or mode (*Newton*).

To MO'DIFY. *v. a.* (*modifier*, French.) 1. To change the external qualities or accidents of any thing; to shape (*Newton*). 2. To soften; to moderate (*Dryden*).

To Mo'dify. *v. n.* To extenuate (*L'Estr.*).

MO'DILLON. *s.* (French.) Modillons, in architecture, are little brackets which are often set under the corinthian and composite orders, and serve to support the projecture of the larmier or drip. See Architecture.

MODIOLUS. (*modiolus*, dim. of *modius*, a measure). In anatomy, the nucleus, as it were, of the cochlea of the ear is so termed. It ascends from the basis of the cochlea to the apex.

MO'DISH. *a.* (from *mode.*) Fashionable; formed according to the reigning custom (*Addison*).

MO'DISHLY. *ad.* Fashionably (*Locke*).

MO'DISHNESS. *s.* (from *modish.*) Affectation of the fashion.

MODON, a strong town of the Morea, with a safe harbour, and a bishop's see. It is seated on a promontory, projecting into the sea of Sapienza, 15 miles E. of Coron, and 95 S.W. of Napoli-di-Romania. Lon. 21. 35 E. Lat. 36. 56 N.

MODREVIUS (Andreas Frichius), secretary to Sigismund Augustus king of Poland, acquired considerable reputation by his learning and works. He broke off from the Romish church, favoured the Lutherans and Antitrinitarians, and took great pains in order to unite all Christian societies under the same communion. Grotius has placed him in the class of the reconcilers of the different schemes of religion. His principal work is entitled, *De republica emendanda.*

To MO'DULATE. *v. a.* (*modulor*, Lat.) To form sound to a certain key, or to certain notes (*Grew*).

MODULATION. *s.* (from *modulate.*) 1. The act of forming any thing to certain proportion (*Woodward*). 2. Sound modulated; harmony (*Thomson*).

Modu'lation, in music, the art of conducting harmony, in composition, or extemporary performance, through those keys and modes which have a due relation to the fundamental, or original key. Though every piece, as is well known, has its principal or governing key, yet, for the sake of contrast and relief, it is not only allowable but necessary to pass from key to key, and from mode to mode; to assume different sharps or flats, and lead the ear through those transitions of tone and harmony which interest the feelings and delight the ear. But though in grand compositions there is no quality of greater importance than that of a masterly modulation, it is not easy to lay down rules for its accomplishment. Sometimes a gradual and almost insensible evolution of harmony is requisite to the composer's object; at other times a bold and sudden change can alone produce the necessary effect.

MO'DULATOR. *s.* (from *modulate.*) He who forms sounds to a certain key; a tuner (*Derham*).

MO'DULE. *s.* (*modulus*, Latin.) An empty representation; a model (*Shakspeare*).

Mo'dule, in architecture, a certain measure, or bigness, taken at pleasure, for regulating the proportions of columns, and the symmetry or disposition of the whole building. Architects generally choose the semidiameter of the bottom of the column for their module, and this they subdivide into parts or minutes.

MO'DULUS OF A LOGARITHM. See Logarithms.

MO'DUS. *s.* (Latin.) Something paid as a compensation for tithes on the supposition of being a moderate equivalent (*Swift*).

MODZIR, a town of Lithuania, capital of a district of the same name. It is seated on the river Prypec, in a fertile country, 85 miles S.E. of Sluczk. Lon. 29. 10 E. Lat. 52. 5 N.

MOE. *a.* (ma, Saxon. See Mo.) More; a greater number (*Hooker*).

MOEBIUS, (Godfrey), professor of physic at Iena, was born at Lauch in Thuringia in 1611. He became first physician to Frederic William elector of Brandenburg, to Augustus duke of Saxony, and to William duke of Saxe-Weimar. He wrote several medical works, which are esteemed; and died at Halle, in Saxony, in 1664.

MOENIUS (Caius), a celebrated Roman consul, conqueror of the ancient Latins, 338 B.C. He was the first who hung up the prows, &c. of the galleys he had taken at the naval engagement of Actium, upon the place where the tribunes harangued the people; from whence it was called the *rostra.*

MOEHRINGIA. Mossy chickweed. In botany, a genus of the class octandria, order digynia. Calyx four-leaved; petals four; capsule one-celled, four-valved. One species only, an Alpine annual herb with white axillary flowers, erect, on slender one-flowered peduncles.

MŒRIS, a steward of the shepherd Menalcas, in Virgil's Ecl. 9. 2. A king of Egypt, the last of the 300 kings from Menes to Sesostris, and reigned 63 years. 3. A celebrated lake in Egypt, supposed to have been dug by the king of the same name. It is about 220 miles in circumference, and intended as a reservoir for the waters during the inundation of the Nile. There were two pyramids in it, 600 feet high, half of which lay under the water, and the other appeared on the surface.

MŒSIA, or MYSIA, (anc. geog.) a country of Europe, extending from the confluence of the Savus and the Danube to the shores of the Euxine. It was divided into Upper and Lower Mœsia. Lower Mœsia was on the borders of the Euxine, and comprehended that tract of country which received the name of Pontus from its vicinity to the sea. Upper Mœsia lay beyond the other, in the inland country.

MOESKIRCH, a town of Suabia, belonging to the princes of Furstenburg, 18 miles N. of Constance, and 52 S. of Stutgard. Lon. 9. 11 E. Lat. 47. 56 N.

MOFFAT, a village of Scotland, in the shire of Annandale, 50 miles south-west of Edinburgh; famous for its sulphureous well, which has been in just estimation for above 150 years as a remedy in all cutaneous and scrophulous complaints; and for its chalybeate spring, perhaps the strongest in Britain, which was discovered about 50 years ago, and is of a very bracing quality. The place is chiefly supported by the company who resort thither for the benefit of its waters and air; but it has also a manufacture of coarse woollen stuffs. It is a well-built clean village; and contains many good and even elegant lodgings, a tolerable assembly-room, a bowling-green and walks, and one of the best inns between London and Edinburgh.

MOFFAT HILLS, the highest mountains in the S. of Scotland. They occupy the N. part of Annandale; and from these descend in different directions the Tweed, Clyde, and Annan, whose sources are but little distant from each other.

MOFFAT WATER, a cold sulphureous water, of a very simple composition. It is exhibited in cutaneous eruptions of every kind, scrophula, ill-conditioned and irritable sores, and in bilious and calculous complaints.

MOGADOR, an island and castle of Africa, in the kingdom of Morocco, near Cape Ozem. There are mines of gold and silver in one of the mountains. Lon. 9. 55 W. Lat. 31. 38 N.

MOGULS (Country of the), or WESTERN CHINESE TARTARY, is bounded on the N. by Siberia, on the E. by Eastern Tartary, on the S. by the great Wall and Leao-tong, and on the W. by Independent Tartary. The Mogul Tartars have neither towns, villages, nor houses; they are wandering hordes, and live under tents, which they remove from one place to another, according as the temperature of the different seasons or the wants of their flocks require: they pass the summer on the banks of their rivers, and the winter at the foot of some mountain, or hill, which shelters them from the cutting north wind. They are naturally clownish, and dirty in their dress, as well as in their tents, where they live amid the dung of their flocks, which when dried they use for fuel instead of wood. Enemies to labour, they choose rather to be satisfied with the food with which their flocks supply them than take the trouble of cultivating the earth: it even appears that they neglect agriculture from pride. During the summer they live only on milk, which they obtain from their flocks, using without distinction that of the cow, mare, ewe, goat, and camel. Their ordinary drink is warm water, in which a little coarse tea has been infused; with this they mix cream, milk, or butter, according to their circumstances. They have also a method of making a kind of spirituous liquor of sour milk, especially of that of the mare. The Moguls are free, open, and sincere. They pride themselves chiefly on their dexterity in handling the bow and arrow, mounting on horseback, and hunting wild beasts. Polygamy is permitted among them; but they generally have only one wife. They burn the bodies of their dead, and carry the ashes to eminences, where they inter them, and cover the grave with a heap of stones, over which they plant a great number of small standards. They are unacquainted with the use of money, and trade only by barter. Although the Moguls might appropriate to themselves the spoils of a great number of animals, the skins which they use for clothing are generally those of their sheep. They wear the wool inmost, and the skin on the outside. The religion of the Mogul Tartars is confined to the worship of Fo. They have the most superstitious veneration for their lamas, who are clownish, ignorant, and licentious priests, to whom they attribute the power of calling down hail or rain; to these lamas they give the most valuable of their effects in return for prayers, which they go about reciting from tent to tent. These people are very devout, and continually wear hanging at their necks a kind of chaplet, over which they say their prayers. All the Moguls are governed by khans, or particular princes, independent of each other; but all subject to the emperor of China, whom they consider as the grand khan of the Tartars. When the Mantchews subdued China, they conferred on the most powerful of the Mogul princes the title of vang, peilé, peizé, and cong, which answer to our titles of king, duke, count, and marquis; each of them had a revenue assigned him, but far inferior to the appoinments of the Mantchew lords at Pekin: the emperor settled the limits of their respective territories, and appointed them laws, according to which they are at present governed. All the Mogul nations under

the Chinese government may be divided into four principal tribes, which are the Moguls, properly so called, the Kalkas, the Ortous, and the Tartars of Kokonor.

MO'HAIR. *s.* (*mohere*, French.) Thread or stuff made of camels or other hair (*Pope*).

MOHAIR, in commerce, the hair of a kind of goat frequent about Angria in Turkey; the inhabitants of which city are all employed in the manufacture of camblets made of this hair. Some give the name mohair to the camblets or stuffs made of this hair: of these there are two kinds; the one smooth and plain, the other watered like tabbies: the difference between the two consists only in this, that the latter is calendered, the other not. There are also mohairs both plain and watered, whose woof is of wool, cotton, or thread.

MOHAIR-SHELL, in conchology, a name given to a peculiar species of voluta, which seems of a closely and finely reticulated texture, and resembles on the surface a piece of mohair, or a very close silk-worm's web.

MOHATZ, a town of Lower Hungary, in the county of Baraniwar. Here Louis, the last king of Hungary, in 1526, was defeated by the Turks under Soliman II. with the loss of 22,000 men, and after the battle suffocated by the fall of his horse in a muddy brook. In 1687, another battle was fought here between the Christians commanded by prince Charles of Lorrain, and the Turks, who were defeated with the loss of 10,000 men, their cannon and baggage. It is seated at the confluence of the Danube and Corasse, 17 miles N.W. of Esseck. Lon. 19. 56 E. Lat. 45. 46 N.

MOHAWK RIVER, a river of the state of New York, which rises to the north of Fort Stanwix, passes by that fort and Skenectady, and empties itself by two mouths into Hudson's River, eight miles above Albany. About two miles above its junction with that river it has a cataract, where the stream, 100 yards wide, falls perpendicularly about seventy feet.

MOHAWKS, a once powerful tribe of Indians in North America, living on the Mohawk River. Only one family are left of them in the state of New York, the rest having, in 1776, emigrated, with sir John Johnson, into Canada.

MOHELIA, or MOHILA, one of the Comora Islands, between the island of Madagascar and the continent of Africa. Ships touch here in their passage to the East Indies. Lat. 11. 55 S. Lon. 45. 0 E.

MOHILOF, or MOHILOW, a strong town of Lithuania, in Poland. The Swedes obtained a victory over the Russians near this place in 1707. Lat. 54. 10 N. Lon. 30. 0 E.

MOHURRUM, the annual commemoration of the death of the Imaum Hossein, observed among the Hindoos. This Hossein is reputed the second son of Ali by Fatima, the daughter of Mahommed. He was killed by the caliph Yezzeed of the house of Omar, at Kerbalaie in Erack Arabia, the ancient Mesopotamia. Those Musselmans who pretend to be the followers of Ali represent during the ten days of this festival all the traditional circumstances connected with the death of Hossein.

MOHRUNGEN, a town of Prussia, in the province of Oberland, situate on a lake of the same name, which almost surrounds it. Here is an old castle, formerly a convent, belonging to the knights of the Teutonic order, in consequence of whose wars the town has frequently suffered. It is 56 miles S.S.W. of Konigsberg, and 56 S.E. of Dantzic.

MO'IDERED. *a.* Crazed; mudded (*Ainsworth.*)

MO'IDORE. *s.* A Portugal coin, rated at one pound seven shillings.

MO'IETY. *s.* (*moitié*, French, from *moien*, the middle.) Half; one of two equal parts (*Clar.*).

To MOIL. *v. a.* (*mouiller*, French.) 1. To daub with dirt (*Knolles*). 2. To weary (*Chapman*).

To MOIL. *v. n.* (*mouiller*, French.) 1. To labour in the mire (*Bacon*). 2. To toil; to drudge (*L'Estrange*).

MOINE (Stephen la), a learned French divine of the protestant persuasion, was born at Caen in 1624. He was professor of divinity at Leyden, and died in 1689. He wrote several esteemed theological treatises.

MOINE (Peter le), a French poet, born at Chaumon in Bassigny in 1602. He was a jesuit, and wrote an epic poem, entitled, Saint Louis, ou la Couronne reconquisé sur les Infidelles. He died in 1672.

MOINE (Francis le), a French painter, born at Paris in 1688. He painted the apotheosis of Hercules in the saloon at Versailles, for which the king made him his first painter, and gave him a large pension. He stabbed himself in a fit of lunacy in 1737.

MOIRA, (sometimes written *Moyra*), a town of Ireland, situated in the county of Down and province of Ulster, 69 miles from Dublin; noted for its linen manufacture, and a monthly market for vending the same. It gives title of earl to the family of Rawdon. Lord Moira has here a very beautiful seat; and here is a handsome church, a charity school, and two dissenting meeting-houses.

MOISSAC, an ancient town of France, in the department of Lot. It has a great trade in corn and flour, and is seated on the Tarn, near the Garonne, 13 miles N.W. of Montauban. Lon. 1. 17 E. Lat. 44. 6 N.

MOIST. *a.* (*moiste*, French.) 1. Wet, not dry; wet, not liquid; wet in a small degree (*Pope*). 2. Juicy; succulent (*Ainsworth*).

To MOIST. *To* MOISTEN. *v.a.* (from *moist.*) To make damp; to make wet to a small degree; to damp (*Shakspeare*).

MO'ISTENER. *s.* (from *moisten.*) The person or thing that moistens.

MO'ISTNESS. *s.* (from *moist.*) Dampness; wetness in a small degree (*Addison*).

MO'ISTURE. *s.* (*moiteur*, French, from moist.) 1. State of being moist; moderate wetness (*Sidney*). 2. Small quantity of liquid (*Addison*).

MOIVRE (Abraham de), was born at Vitri

in Champagne, A.D. 1667. His father was a surgeon. At the revocation of the edict of Nantes he determined to fly into England rather than abandon the religion of his fathers. Before he left France he had begun the study of mathematics; and having perfected himself in that science in London, he was obliged, by the meanness of his circumstances, to teach it. Newton's Principia, which accidentally fell into his hands, showed him how little progress he had made in a science of which he thought himself master. From this and Newton's other work he acquired a knowledge of the geometry of infinites with as great facility as he had learned the elementary geometry; and in a short time he was fit to be ranked with the most celebrated mathematicians. His success in these studies procured him a seat in the Royal Society of London and in the Academy of Sciences at Paris. His merit was so well understood in the former, that he was thought capable of deciding in the famous dispute between Leibnitz and Newton concerning the differential calculus. He published a Treatise on Chances in 1738, and another on Annuities in 1752; both extremely accurate and valuable. The Philosophical Transactions contain many interesting memoirs of his composition.—Some of them treat of the method of fluxions; others are on the lunula of Hippocrates; others on physical astronomy, in which he resolved many important problems; and others, in short, on the analysis of the games of chance, in which he followed a different course from that of Montmort. Towards the close of his life he lost his sight and hearing; and the demand for sleep became so great that he required twenty hours of it in a day. He died at London, 1754, aged 87. His knowledge was not confined to mathematics; but he retained to the last a taste for polite literature. He was intimately acquainted with the best authors of antiquity; and he was frequently consulted about difficult passages in their works. Rabelais and Moliere were his favourite French authors; he had them by heart; and he one day observed to one of his acquaintance, "that he would rather have been Moliere than Newton." He recited whole scenes of the Misanthrope with that delicacy and force with which he remembered to have heard them recited at Paris 70 years before by Moliere's own company. He judged severely of mankind; and could never conceal his disgust at the conversation of a fool, nor his aversion to cunning and dissimulation. He was free from the affectation of science; and no one could know him to be a mathematician but from the accuracy of his thoughts. His conversation was general and instructive. Whatever he said was well digested and clearly expressed. His style possessed more strength and solidity than ornament and animation; but he was always correct, and he bestowed as much pains on his sentences as on his calculations. He could never endure any bold assertions or indecent witticisms against religion. "I show you that I am a Christian (said he one day to a person who thought to pay him a compliment by observing that mathematicians were attached to no religion), by forgiving the speech you have now made." The practice of giving vails to servants was not laid aside in his time; and, on this account, when a nobleman asked him why he did not dine oftener with him? "You must excuse me, my lord (replied he), I cannot afford it."

MOKES OF A NET. The meshes (*Ains.*).

MO'KY. *a.* Dark; murky (*Ainsworth*)

MOLA (Pietro Francesco), an eminent painter, was born, according to most authors, at Lugano, a city belonging to the Switzers, in the year 1609. Others affirm that the place of his birth was Coldra, in the district of Como. He was at first the disciple of Giuseppe d'Arpino, and afterwards of Albano. When he quitted the school of the latter he went to Venice, and studied assiduously the pictures of Titian, Tintoretto, Bassau, and Paolo Veronese. He painted historical subjects and landscapes with great success; but his genius seemed more particularly adapted to the latter. His pictures, in both styles, are spoken of with the warmest commendations. He died in 1665.—He had a brother, Giovanni Battista, who was also a painter, and of some merit, but very inferior to that of the older.

Mola, (*Mola*, Hebr.) 1. The knee-pan so named, because like a mill-stone. 2. A shapeless mass of flesh in the uterus; a false conception. See Midwifery.

Mola di Bari, a town of Naples, in Terra di Bari, on the coast of the gulf of Venice, 12 miles E. of Bari.

Mola di Gaeta, an ancient town of Naples, in Terra di Bari, seated on the gulf of Venice, 14 miles E. of Bari.

MOLARIS. (from *molaris*, a grindstone, because they grind the food.) A double tooth. See Teeth.

MOLAR GLANDS. *Glandulæ molares.* Two salival glands situated on each side of the mouth, between the masseter and buccinator muscles, and whose excretory ducts open near the last dens molaris.

MOLASSES. See Molosses.

MOLD, a town in Flintshire, where the assizes are held. It is five miles S. of Flint.

MOLDAVIA, a province of Turkey in Europe, 270 miles long and 210 broad; bounded on the N. by Poland, from which it is also divided on the N.E. by the Dniester; on the E. by New Russia; on the S. E. by Bessarabia; on the S. by Bulgaria, from which it is parted by the Danube; on the S.W. by Walachia; and on the W. by Transylvania and Hungary. The other principal rivers are the Pruth, Moldau, and Bardalach. The soil is rich, and it abounds in good pastures, which feed a great number of horses, oxen, and sheep: it also produces corn, pulse, honey, wax, fruits, with plenty of game and fowls. The sovereign, who is styled hospodar, is tributary to the grand seignior. The inha-

bitants are Christians of the Greek church, and Jassy is the principal town.

MOLDAVIAN BAUM, in botany. See DRACOCEPHALUM.

MOLE. *s.* (mœl, Saxon; *mole*, French.) 1. A formless concretion of extravasated blood, which grows into a kind of flesh in the uterus, and is called a false conception (*Quincy*). 2. A natural spot or discoloration of the body (*Pope*). 3. A mound; a dike (*Sandys*). 4. A little beast that works under ground.

MOLE, a mountain of Savoy, which, from its height and fine sloping peak, is an object of great beauty when seen from the lake of Geneva. At its foot is the town of Bonneville, 20 miles S. of Geneva.

MOLE, a river in Surry, which runs to Darking, and passing beneath Box Hill, is believed to disappear in its vicinity, and to rise again near Leatherhead. Hence it is supposed to derive its name: but the fact is, that a tract of soft ground, two miles in length, called the Swallows, in very dry seasons absorbs the waste water in caverns in the sides of the banks; but not so as to prevent a constant stream from flowing into an open channel above ground. The Mole, proceeding from Leatherhead to Cobham, enters the Thames at E. Moulsey.

MOLE (St. Nicholas). See NICHOLAS, ST.

MOLE, in mastiology. See TALPA.

MOLE-RAT, in mastiology. See MUS.

MOLES. (*mola.*) In medicine. By this term authors have intended to describe very different productions of, or excretions from, the uterus.

By some it has been used to signify every kind of fleshy substance, particularly those which are properly called polypi; by others, those only which are the consequence of imperfect conception, or when the ovum is in a morbid or decayed state; and by many, which is the most popular opinion, every coagulum of blood which continues long enough in the uterus to assume in form, and to have only the fibrous part, as it has been called, remaining.

There is surely much impropriety, says Dr. Denman, in including under one general name appearances so contrary, and substances so different.

For an account of the first kind, see POLYPUS.

Of the second kind, which has been defined an *ovum deforme*, as it is the consequence of conception, it might more justly be arranged under the class monsters; for though it has the appearance of a shapeless mass of flesh, if examined carefully with a knife, various parts of a child may be discovered, lying together in apparent confusion, but in actual regularity. The pedicle also by which it is connected to the uterus is not of a fleshy texture, like that of the polypus, but has a regular series of vessels like the umbilical cord, and there is likewise a placenta and membranes containing water. The symptoms attending the formation, growth, and expulsion of this apparently confused mass from the uterus, correspond with those of a well formed child.

With respect to the third opinion of a mole, an incision into its substance will discover its true nature; for although the external surface appears at the first view to be organized flesh, the internal part is composed merely of coagulated blood.

MOLE-CRICKET, in zoology. See GRYLLOTALPA.

MO'LECAST. *s.* (*mole* and *cast.*) Hillock cast up by a mole (*Mortimer*).

MO'LECATCHER. *s.* (*mole* and *catcher.*) One whose employment is to catch moles.

MO'LEHILL. *s.* (*mole* and *hill.*) Hillock thrown up by the mole working under ground.

Various means have been contrived for extirpating moles, such as irrigating the fields infested with them, &c.; but the most effectual is that described by Dr. Darwin in his Phytologia, and derived from the experience of a successful mole-catcher. This man commenced his operations before the rising of the sun, when he carefully watched their situation; and, frequently observing the motion of the earth above their walks, he struck a spade into the ground behind them, cut off their retreat, and dug them up.

As moles usually place their nests much deeper in the ground than their common habitations are situated, and thus produce an elevation, or a mole-hill, the next step is to demolish such nests by the spade; after which the frequented paths must be distinguished from the by-roads, for the purpose of setting subterraneous traps. This will be effected by marking every new mole-hill with a slight pressure of the foot, and observing the next day whether a mole has passed over it and effaced such mark; which operation must be repeated two or three mornings in succession, but without making an impression so deep as to alarm and induce the animal to open another passage.

The traps must now be set in the frequented paths, and ought to consist of a hollow wooden semicylinder, each end of which should be furnished with grooved rings, containing two nooses of horse-hair, that are fastened loosely in the centre, by means of a peg, and are stretched above the surface of the ground by a bent stick or strong hoop. As soon as the mole passes half way through one of these nooses, and removes the central peg in his course, the curved stick rises in consequence of its elasticity, and thus strangles the animal.

The method above detailed being ingenious, it deserves to be generally adopted; as those whose grounds are infested with moles may easily extirpate them, or teach the art to their labourers. It is, however, in our opinion, an undecided point, whether these little quadrupeds, that live entirely on worms and insects, of which they consume incalculable numbers, are not to be considered as harmless,

nay, useful rather than noxious; especially as they have their formidable natural enemies in foxes, martins, weasels, hedge-hogs, serpents, and cats. Farther, it has been observed, that fields and gardens where all the moles had been caught abounded with vermin and insects. But, if these burrowing creatures become too numerous and hurtful to the vegetation of plants, or dangerous to dykes and banks, the most easy method of destroying them is to expose a few living lobsters in a deep-glazed earthen vessel, the top of which is somewhat narrower than its basis, so that they cannot escape: such a pot must be buried several inches deep in the ground, and covered with green sods, so as to be accessible to the mole, which is remarkably partial to that shell-fish. No sooner has one of the former entered the pot, than others from the vicinity will hasten to the fatal receptacle, in consequence of the noise made by the captive; and thus meet with inevitable destruction.

To MOLE'ST. *v. a.* (*molestus*, Latin.) To disturb; to trouble: to vex (*Locke*).

MOLESTA'TION. (*s. molestia*, Latin.) Disturbance; uneasiness caused by vexation (*Brown*).

MOLE'STER. *s.* (from *molest*.) One who disturbs.

MOLESWORTH (Robert), an Irish nobleman and writer, was born at Dublin in 1656. His father was a merchant, and left him a considerable fortune. He married a sister of the earl of Bellamont, and concurred so heartily in the revolution, that king William made him one of his privy-council, and in 1692 sent him envoy-extraordinary to Denmark; but his behaviour proving disagreeable to the Danish monarch, he was forbidden the court, after residing there three years. On this he returned to England, where he wrote his Account of Denmark, which was well received by the public, but gave great offence to the government of that country. George I. made him a commissioner of trade and plantations, and advanced him to the peerage of Ireland in 1716. He died in 1725.

MO'LETRACK. *s.* (*mole* and *track*.) Course of the mole under ground (*Mortimer*).

MO'LEWARP. *s.* (*mold* and peoppan, Sax.) A mole: properly *mouldwarp* (*Drayton*).

MOLIERE (Jean Baptiste, Pocquelin de), a French comic writer, whose real name was Pocquelin, was born at Paris about 1620. He was intended for the business of a tapestry-maker, which was his father's occupation; but his grandfather often taking him to the theatre, the boy conceived so great a disgust to trade that his father allowed him to follow his studies, which he did under the jesuits. When cardinal Richelieu gave his protection to dramatic poets, there were set up several private theatres at Paris, to one of which Moliere attached himself, and then it was that he changed his name. In 1653 he formed a theatrical company, in conjunction with La Bejart, an actress of promising talents, and went to Lyons, where he produced his first play, called L'Etourdi, or the Blunderer. After visiting several places, this company came to Paris, and exhibited before the court in 1658, and were so well approved, that the king took them into his service, and Moliere obtained a pension. His last comedy was, La Malade Imaginaire, or the Hypochondriac. This piece was acted the fourth time Feb. 17, 1673, and on that day Moliere died. The circumstance of his death was very extraordinary: The chief character in the play is a sick man, who on a certain occasion pretends to be dead; Moliere performed this part, and is said to have died in the exhibition of it. Voltaire says of Moliere, that "he retrieved comedy out of chaos, as Corneille did tragedy."

MOLIERES, a town of France, in the department of Lot, 11 miles N. of Montauban, and 16 S. of Cahors. Lon. 1. 30 E. Lat. 44. 10 N.

MOLINA, a strong town of Spain, in New Castile, seated on the Gallo, in a territory abounding in pasture, 35 miles S.E. of Siguenza, and 88 E.N.E. of Madrid. Lon. 1. 53 W. Lat. 40. 50 N.

MOLINA (Lewis), a Spanish lawyer who was employed by Philip II. king of Spain in the councils of the Indies and of Castile. He is the author of a learned treatise concerning the entails of the ancient estates of the Spanish nobility, entitled, De Hispanorum Primogenitorum Origine et Natura, published in 1603, in folio. This book is likewise applicable to several provinces in France. Lewis Molina must not be confounded with John Molina, a Spanish historian, author of Cronica antiqua d'Arragon, published in 1524, in folio; and also of De las Casas memorables d'Espagna, in folio. The first work appeared at Valencia, and the second at Alcala.

MOLINISTS, in ecclesiastical history, a sect in the Romish church who follow the doctrine and sentiments of the Jesuit Molina, relating to sufficient and efficacious grace. He taught that the operations of divine grace were entirely consistent with the freedom of human will; and he introduced a new kind of hypothesis to remove the difficulties attending the doctrines of predestination and liberty, and to reconcile the jarring opinions of Augustines, Thomists, Semi-Pelagians, and other contentious divines. He affirmed that the decree of predestination to eternal glory was founded upon a previous knowledge and consideration of the merits of the elect; that the grace, from whose operation these merits are derived, is not efficacious by its own intrinsic power only, but also by the consent of our own will, and because it is administered in those circumstances in which the Deity, by that branch of his knowledge which is called *scientia media*, foresees that it will be efficacious. The kind of prescience, denominated in the schools *scientia media*, is that foreknowledge of future contingents that arises from an acquaintance with the nature and faculties of

rational beings, of the circumstances in which they shall be placed, of the object that shall be presented to them, and of the influence which their circumstances and objects must have on their actions.

MOLINÆA, in botany, a genus of the class octandria, order monogynia. Calyx five-parted; corol five-petalled; filaments villous at the base; styleless; capsule three-celled, three-valved; the cells one-seeded. Three species, indigenous to the isle of Bourbon, and the East Indies.

MOLISE, a territory of Naples, in the form of a triangle, whose sides are 30 miles long, lying between Terra di Lavoro, Abruzzo Citeriore, Capitaneta, and Principato Ulteriore. It is a mountainous country, but fertile in corn, wine, saffron, and silk.

MOLISE, a town of Naples, capital of a territory of the same name, but not populous. It is 50 miles N. of Naples. Lon. 14. 43 E. Lat. 41. 36 N.

MOLLE *Soft* or *Sweet*. In music, a relative term used by the French, signifying a flat sound; that is, a sound which is half a tone lower than the sound with which it is compared: as B flat, or B molle, is a semitone beneath B natural, or B durum. This term, as its sense intimates, is applied to the flat sounds on account of their supposed softness or sweetness in comparison with the effect of the natural and sharp tones.

MO'LLIENT. *a.* (*molliens*, Latin.) Softening.

MO'LLIFIABLE. *a.* (from *mollify*.) That may be softened.

MOLLIFICA'TION. *s.* (from *mollify*.) 1. The act of mollifying or softening (*Bacon*). 2. Pacification; mitigation (*Shakspeare*).

MO'LLIFIER. *s.* (from *mollify*.) 1. That which softens; that which appeases (*Bacon*). 2. He that pacifies or mitigates.

To MO'LLIFY. *v. a.* (*mollio*, Latin.) 1. To soften; to make soft. 2. To assuage (*Isaiah*). 3. To appease; to pacify; to quiet (*Spenser*). 4. To qualify; to lessen any thing harsh or burdensome (*Clarendon*).

MOLLITIES OSSIUM. (*Mollities*, from *mollis*, soft.) A disease of the bones, in which they can be bent without fracturing them.

MOLLITIES UNGUINUM. A preternatural softness of the nails that often accompanies chlorosis.

MOLLOY (Charles, Esq.), descended from a good family in the kingdom of Ireland, was born in the city of Dublin, and received part of his education at Trinity college there, of which he afterwards became a fellow. At his first coming to England he entered himself of the Middle Temple, and was supposed to have had a very considerable hand in the writing of a periodical paper called Fog's Journal; as also since that time to have been almost the sole author of another well known paper, entitled Common Sense. All these papers give testimony of strong abilities, great depth of understanding, and clearness of reasoning. Dr. King was a considerable writer in the latter, as were lords Chesterfield and Lyttelton. Our author had large offers made him to write in defence of sir Robert Walpole, but these he rejected: notwithstanding which, at the great change of the ministry in 1742, he was entirely neglected, as well as his fellow-labourer Amherst, who conducted The Craftsman. Mr. Molloy, however, having married a lady of fortune, was in circumstances which enabled him to treat the ingratitude of his patriotic friends with the contempt it deserved. He lived many years after this period, dying so lately as July 16, 1767. He also wrote three dramatic pieces, viz. The Perplexed Couple; The Coquet; and The Half-pay Officers; none of which met with much success.

MOLLUCELLA, in botany, a genus of the class didynamia, order gymnospermia. Calyx campanulate, dilated, broader than the corol, spinous. Six species, natives of the Molucca islands, Syria, and Tartary; some of them shrubs, others annual herbaceous plants.

MOLLUGO, African chickweed, in botany, a genus of the class triandria, order trigynia. Calyx five-leaved: corolless; capsule three-celled, three-valved. Six species, natives of the East Indies, South America, and the Cape.

MOLLUSCA, in zoology, the second order of the Linnéan class vermes; they are naked, simple animals, not included in a shell; furnished with tentacles or arms; for the most part inhabitants of the sea; by their natural phosphorescence they illuminate in a considerable degree the dark abyss of waters, and often reflect their corruscations to the firmament. See ZOOLOGY and VERMES.

MOLOCH, a false god of the Ammonites, who dedicated their children to him, by making them "pass through the fire," as the scriptures express it. There are various opinions concerning this method of consecration. Some think the children leaped over a fire sacred to Moloch; others, that they passed between two fires; and others, that they were really burnt in the fire, by way of sacrifice to this god. There is foundation for each of these opinions. For, first, it was usual among the pagans to lustrate or purify with fire; and, in the next place, it is expressly said, that the inhabitants of Sepharvaim burnt their children in the fire to Anamelech and Adramelech; much such deities as Moloch of the Ammonites.

Moses, in several places, forbids the Israelites to dedicate their children to this god as the Ammonites did, and threatens death and utter extirpation to such persons as were guilty of this abominable idolatry. And there is great probability that the Hebrews were much addicted to the worship of this deity; since Amos, and after him St. Stephen, reproaches them with having carried along with them into the wilderness the tabernacle of their god Moloch.

Solomon built a temple to Moloch upon the mount of Olives; and Manasseh, a long time

after, imitated his impiety by making his son pass through the fire in honour of Moloch. It was chiefly in the valley of Tophet and Hinnom, to the east of Jerusalem, that the Israelites paid their idolatrous worship to this false god of the Ammonites.

There are various sentiments concerning the relation which Moloch had to the other pagan divinities. Some believe he was the same with Saturn, to whom it is well known that human sacrifices were offered. Others suppose him to be Mercury; others, Mars; others, Mithras; and others, Venus. Lastly, others take Moloch to be the sun, or the king of heaven. Moloch was likewise called Milkom; as appears from what is said of Solomon, that he went after Ashtaroth the abomination of the Zidonians, and Milkom the abomination of the Ammonites.

MOLORCHUS, an old shepherd near Cleonæ, who received Hercules with great hospitality. The hero, to repay the kindness he received, destroyed the Nemæan lion, which laid waste the neighbouring country, and therefore the Nemæan games instituted on this occasion are to be understood by the words *Ludus Molorchi*. There were two festivals instituted in his honour called Molorcheæ.

MOLORCHUS, in the Fabrician system of entomology, a tribe of the genus NECYDALIS, which see.

MOLOSSES, MOLASSES, or MELASSES, that gross fluid matter remaining of sugar after refining, and which no boiling will bring to a consistence more solid than that of syrup; hence also called syrup of sugar. Properly, molosses are only the sediment of one kind of sugar called chypre, or brown sugar, which is the refuse of other sugars not to be whitened or reduced into loaves. Molosses are much used in Holland for the preparation of tobacco, and also among poor people instead of sugar. There is a kind of brandy or spirit made of molosses; but by some held exceedingly unwholesome. See below.

MOLOSSES SPIRIT; a very clean and pure spirit, much used in England, and made from molosses or common treacle dissolved in water, and fermented in the same manner as malt or the common malt-spirit. (See DISTILLATION.) Molosses spirit coming dearer than that of malt, it is frequently met with basely adulterated with a mixture of that spirit, and indeed seldom is to be bought without some dash of it. Many have a way of mixing malt in the fermenting liquor; by this the yield of the whole is greatly increased, and the maker may assure the buyer that the spirit is pure as it ran from the worm. In most of the nice cases in our compound distillery the molosses spirit supplies the place of a pure and clean spirit. Our cinnamon, citron, and other fine cordial waters, are made with it; for the malt spirit would impart to these a very disagreeable flavour. Molosses spirit, it is possible, the vinegar-makers may find use for; but the most advantageous of all its uses is to the distiller himself; a quantity of it added to new treacle intended for fermentation will be of great use in the process, and increase very considerably the quantity of spirit; but the proportion in regard to the new matter must not be too great.

MOLOSSI, a people of Epirus, who inhabited that part of the country which was called Molossia or Molossus, from king Molossus, a son of Pyrrhus and Andromache. This country had the bay of Ambracia on the south, and the country of the Perrhæbeans on the east. The dogs of the place were famous, and received the name of Molossi among the Romans.—Dodona was the capital of the country, according to some writers. Others, however, reckon it as the chief city of Thesprotia.

MOLOSSUS, a son of Pyrrhus and Andromache. He reigned in Epirus after the death of Helenus, and part of his dominions received the name of Molossia from him. (*Paus.*)

MOLOSSUS, in the Greek and Latin poetry, a foot consisting of three long syllables. As, *audiri, cantabant, virtutem*. It takes its name either from a dance in use among the people called Molossi or Epirotæ; or from the temple of Jupiter Molossus, where odes were sung, in which this foot had a great share.

MOLSHEIM, a town in France, in the department of Lower Rhine, seated on the Brusch, 10 miles W. by S. of Strasburg, and 228 E. of Paris. Lon. 7. 35 E. Lat. 48. 32 N.

MOLTEN. The part. pass. from *melt*.

MOLTEN GREASE, called also MORFOUNDER, or BODY FOUNDER. In veterinary language, a disease produced by too great, sudden, or powerful exertions, when a horse is not in proper condition: as in strong and severe hunting, long and speedy journeys, or hard driving in carriages, when the animal has been just taken from grass loaded with impurities; just out of a dealer's possession, full of light flatulent food; or when naturally too full of flesh for violent exercise. "In such cases," says Taplin, "from the internal heat, increased circulation, and temporary inflammation, the fat seated upon the membranes in various parts of the body undergoes rarefaction and rapid solution, making distinct efforts for discharge by the different emunctories. The proportion nearest the vessels becomes absorbed, and there is produced some degree of fever; another part makes its appearance in the excrements; a third portion fixes upon the lungs, and obstructs respiration; to these a laxation of the intestinal contents succeeds; and, lastly, a looseness, or scouring; so that in the present instance we plainly perceive the possibility of almost a complication of disorders originating in a single cause, and the foundation of that cause—indiscretion.

"A little reflection upon the incontrovertible truth of this observation will surely point out to every humane master and faithful servant the great danger of over-riding, driving,

or fatiguing any horse whatever beyond what is prudent and necessary; especially when not in high condition for the service he may be engaged in, whether on the turf, field, or road. Let it be constantly held in remembrance, more horses are ruined and destroyed by cruelty and neglect than by chance or accident. The subject we now treat on proves, more than any other, the absolute necessity of insuring condition previous to a course of constant business." See CONDITION.

The symptoms, observes the same writer, are in different subjects more or less violent, according to their state and condition at the time of attack; varying in all in proportion to the parts most affected by the original cause. "Wherever the solution has proved most partial, the effect will become most predominant; as, for instance, upon the bowels, lungs, or circulation of the blood by absorption. In the first, great pain attends the laxation or looseness; in the second, great difficulty of breathing from the expansion of the lungs may produce symptoms of inflammation there. And when the mass of blood is generally affected, and preternaturally loaded, fever must consequently ensue. These symptoms, as before observed, all vary in different subjects; but one is pathognomonic or invariable in all, which is the general incorporation of a greasy substance with the excrements, nearly similar to the separated particles of congealed oil in frosty weather; previous to the entire solution of the intestinal contents, and so long as the dung retains its usual form, the greasy hue appears only upon the surface, but as it advances in disease it becomes more intimately united.

"So soon as ever these symptoms are perceived, proper methods should be taken to relieve nature from the threatening oppression, by such evacuations as the predominant circumstances direct; at any rate let plentiful bleeding be the first step to reduce present, or prevent approaching, inflammation. If fever have not come on too rapidly, give, as soon as circumstances will permit, mild laxative drinks; and more powerful if the strength of the horse will allow it.

"To attenuate the blood, relieve the lungs, and take off the load from the circulation, as well as to mitigate all symptoms of fever (if such there are), adopt a cooling plan of treatment, with the assistance of bran water or pectoral decoction, especially if the lungs are much oppressed, or the approach of inflammation apprehended. The appetite must also be attended to, and solicited in every stage of the disease by comfortable mashes."

As soon as the predominant symptoms subside, Mr. Taplin recommends to proceed to a course of mild purging balls, going regularly through three doses, at such periods as are best adapted to the strength of the horse. In a few days, after working off the last dose too, we are instructed to begin upon warm diuretics, well guarded with aromatics, giving one every morning for a fortnight.

"The work begun by the alterative purges will be completed by the gradual effects of the diuretics; and, with proper attention to the rules laid down, the horse may be soon produced in good state and condition."

The foregoing account of this singular disease is conformable to that of Gibson, Bracken, Wood, and other veterans of the old school. Mr. John Lawrence also repeats their account of it, accords principally with their treatment, and asserts that he has "repeatedly seen it, though not in any very dangerous form;" nay, that when a boy he was the occasion of it in a horse encumbered with flesh and fat, having ridden him hard in hot weather. It is worthy of remark, however, that the latest veterinary writers have taken no notice of this disease, or at least have declined treating of it under the unscientific and vague appellation of molten (i. e. melted) grease. Chemical tests applied to this matter discharged from the intestines would readily decide the question as to its real nature; which, instead of fat, we rather suspect to be the coagulable lymph of the blood, transuded through the coats of the intestines, or else a redundancy of their natural mucus.

MOLTO. (Ital.) Very, or Much. A word used in music, in conjunction with some other, by way of augmentation; as, *molto allegro*, very quick; *molto adagio*, very slow.

MOLUCCA ISLANDS, islands in the Eastern Indian Sea. These valuable islands, strictly speaking, consist of no more than five: viz. Ternate, Timor, or Motir, Tydor, Machian, and Bachian; but Amboyna, Bourso, Ceram, and several others, are now included in the name of Moluccas. The five former are not out of sight of each other, and lie all of them within the compass of twenty-five leagues. They are famous for producing several sorts of valuable spices, but especially nutmegs and cloves, and are under the dominion of three kings. Their coasts are rendered very dangerous by sands and shelves. They were formerly subject to the Chinese, fell next under the Javanese, were, in process of time, subdued by the Malayans; and the Mahometans had begun to settle in them, and convert the inhabitants to their religion but a very little while before they were discovered by the Portuguese. Their chief riches consist in cloves: they have extraordinary parrots, which exceed in beauty those of the West Indies: and many birds of paradise. They have also almonds, and coarse tobacco. During their wars with the Portuguese, they burnt all their clove-trees, retired to the mountains and deserts, and forbad selling any thing to that nation on pain of death: a prohibition which reduced them to great extremity. Though they burnt the cloves out of despair, their ashes so enriched the soil that it produced cloves in greater abundance than ever in a few years. Many of these islands had their particular kings, but all subject to the king of Ternate; and they served under him to revenge

the death of king Aerio, who was treacherously murdered by the Portuguese. This great king's name was Cachil Babu, Aerio's third son. He allowed the Dutch to trade here; in 1599 entered into a strict friendship with them, and they assisted him to shake off the yoke of the Spaniards and Portuguese.

MOLUCCENSE LIGNUM. See LIGNUM PAVANAE.

MOLY, in botany. See ALLIUM.

MOLYBDATS. (*molybdas*). Salts formed by the union of the molybdic acid with different bases: thus, molybdat of alumin, molybdat of antimony, &c.

MOLYBDAT OF LEAD. See PLUMBUM.

MOLYBDÆNUM, in mineralogy, a genus of the class metals. Blueish grey, not tarnishing, brittle, not magnetic, composed of scaly particles cohering together; specific gravity 7,500; nearly infusible, gradually becoming a white, volatile oxyd when heated, which with borax forms a violet, and with microcosmic salt a green glass; partly soluble in sulphuric acid, and giving the solution a green and then a blue colour. One species only; M. vulgare, common molybdænum; molybdæna; molybdenite; sulphurised molybdæna, Schmeisser; sulphuret of molybdæna, Thomson; wasserbley, Werner. Found in France, Spain, Sweden, Saxony, Siberia, and Iceland, in gangues of feldspar, lithomarge, or quartz, generally in masses consisting of small grains agglutinated together, sometimes crystallised in six-sided tables; colour light lead-grey, with sometimes a shade of red; streak blueish-grey, metallic; powder blueish; soft, opake, staining the fingers, and feeling a little greasy to the touch; texture lamellar, with the foliations thin, incurved, and slightly flexible: with warm nitric acid it effervesces, leaving a grey oxyd undissolved; before the blow-pipe it evaporates in white sulphureous vapours; specific gravity from 4,569 to 4,738; contains,

Molybdænum	60
Sulphur	40
	100

The yellow lead ore, or molybdat of lead, as it is called by Thomson, seems rather to be a species of lead than of molybdænum, and will hence be found arranged under the article PLUMBUM.

From the experiments of Mr. Hatchet, it follows that molybdænum is capable of combining with four different proportions of oxygen, and of forming four oxyds; namely, 1. The black; 2. the blue; 3. the green, to which Mr. Hatchet has given the name of molybdous acid; and, 4. the yellow or white, or the molybdic acid.

1. The protoxyd, or black oxyd, may be obtained by mixing molybdic acid with charcoal powder in a crucible, and applying heat. A black mass remains, which is the black oxyd. It seems to contain only a very minute quantity of oxygen.

2. The blue oxyd may be obtained by the same process not carried so far: it is formed also whenever a plate of tin is plunged into a solution of molybdic acid.

3 The peroxyd is obtained by distilling six parts of diluted nitric acid repeatedly off native molymbdena in powder. A white mass is left behind, composed of sulphuric and molybdic acids. A little pure water washes away the sulphuric acid, and molybdic acid remains behind. This acid has at first a white colour; but when melted and sublimed it becomes yellow.

Molybdænum combines readily with sulphur, and the compound has exactly the properties of molybdæna, the substance which Scheele decompounded. Molymbdæna is therefore sulphuret of molybdenum. The reason that Scheele obtained from it molybdic acid was, that the metal combined with oxygen during his process. Sulphuret of molybdænum may be formed also by distilling together one part of molybdic acid and five parts of sulphur. Molybdenum is also capable of combining with phosphorus.

Few of the alloys of this metal have been hitherto examined.

It seems capable of uniting with gold. The alloy is probably of a white colour. It combines readily with platinum in the state of an oxyd. The compound is fusible. Its specific gravity is 20,000.

The alloys of molybdenum with silver, iron, and copper, are metallic and friable; those with lead and tin are powders which cannot be fused. Several other combinations have been made both by Hielm and Richter; but as the metals which they tried were alloyed not with molybdænum, but with molymbdic acid, they cannot be considered as by any means the same with the alloys formed by molybdænum itself.

Assay and *Analysis*.—The most usual way of decomposing the sulphuret of molybdæna is by detonation with nitre: but by this means the molybdic acid becomes so intimately combined with pot-ash as to render it extremely difficult by subsequent operations to obtain. The best method of proceeding therefore appears to be the following.

a. To one part of finely pulverized molybdæna add four or five parts of moderately diluted nitric acid, and distil the mixture nearly to dryness: then return the contents of the receiver into the retort, add some more nitric acid, and proceed a second time to distillation: repeat this for three or four times till the insoluble matter in the retort is as white as chalk. Then pour off the supernatant fluid, and wash the white matter repeatedly in warm water, adding the washings to the other fluid.

b. Evaporate the residual fluid to a moderate degree of concentration, and then pour in ammonia: the first portions will occasion a precipitation; but by adding more ammonia and assisting the process by a gentle warmth, the whole precipitate will be re-dissolved: then drop in strong nitric acid to complete the satu-

ration of the alkali, and a white precipitate will fall down, which is to be separated by the filter, and washed in warm water.

c. The residual fluid with the washings being mixed together now contains ammonia combined with nitric and sulphuric acids, the latter of which arises from the oxygenation of the sulphur in the ore. Nitrat of baryte being dropped in, a precipitation of sulphated baryte takes place, from the amount of which the quantity of sulphur in the ore is readily inferred.

d. The white matter obtained in processes *a* and *b*, which is molybdic acid with a little oxyd of iron, must now be dissolved in strong sulphuric acid, and the solution subsequently diluted with 16 times its weight of water: ammonia being now cautiously added to perfect saturation, the iron will gradually fall down in the state of yellow oxyd.

e. The clear liquor of the preceding process being evaporated to dryness, the salt thus procured is to be strongly treated in a glass vessel till all the sulphat of ammonia is expelled: what remains behind is a black blistered mass, which by abstraction with nitric acid is converted into a yellow powder, which is pure molybdic acid.

The only material objection to this method of analysis is that the molybdæna exists in its metallic state in the ore, but is obtained in the analysis in the state of acid: and as the amount of oxygen in molybdic acid has not yet been ascertained, this analysis is at best only an approximation to a true knowledge of the ingredients of the ore, so long as we remain ignorant of the composition of molybdic acid.

Neither the metal nor any of its preparations have hitherto been made use of.

MOLYBDENITE. See MOLYBDÆNUM.

MOLYNEUX (William), an excellent mathematician and astronomer, was born at Dublin in 1656. After the usual grammar education, which he had at home, he was entered of the university of that city. Here he distinguished himself by the probity of his manners, as well as by the strength of his parts; and having made a remarkable progress in academical learning, and particularly in the new philosophy, as it was then called, after four years spent in this university, he was sent over to London, where he was admitted into the Middle Temple in 1675. Here he spent three years, in the study of the laws of his country. But the bent of his genius lay strongly toward mathematical and philosophical studies; and even at the university he conceived a dislike to scholastic learning, and fell into the methods of lord Bacon.

Returning to Ireland in 1678, he shortly after married Lucy the daughter of sir William Domville, the king's attorney-general. Being master of an easy fortune, he continued to indulge himself in prosecuting such branches of natural and experimental philosophy as were most agreeable to his fancy; in which astronomy having the greatest share, he began, about 1681, a literary correspondence with Mr. Flamsteed, the king's astronomer, which he kept up for several years. In 1683 he formed a design of erecting a Philosophical Society at Dublin, in imitation of the Royal Society at London; and, by the countenance and encouragement of sir William Petty, who accepted the office of president, began a weekly meeting that year, when our author was appointed their first secretary.

Mr. Molyneux's reputation for learning recommended him, in 1684, to the notice and favour of the first great duke of Ormond, then lord lieutenant of Ireland, by whose influence chiefly he was appointed that year, jointly with sir William Robinson, surveyor-general of the king's buildings and works, and chief engineer.

In 1685, he was chosen fellow of the Royal Society at London; and that year he was sent by the government to view the most considerable fortresses in Flanders. Accordingly he travelled through that country and Holland, with part of Germany and France; and carrying with him letters of recommendation from Flamsteed to Cassini, he was introduced to him, and others, the most eminent astronomers in the several places through which he passed.

Soon after his return from abroad, he printed at Dublin, in 1686, his Sciothericum Telescopium, containing a Description of the Structure and use of a Telescopic Dial, invented by him: another edition of which was published at London in 1700.

In 1688 the Philosophical Society of Dublin was broken up and dispersed by the confusion of the times. Mr. Molyneux had distinguished himself as a member of it from the beginning, and presented several discourses upon curious subjects; some of which were transmitted to the Royal Society at London, and afterwards printed in the Philosophical Transactions. In 1689, among great numbers of other Protestants, he withdrew from the disturbances in Ireland, occasioned by the severities of Tyrconnel's government; and after a short stay at London he fixed himself with his family at Chester. In this retirement he employed himself in putting together the materials he had some time before prepared for his Dioptrics, in which he was much assisted by Mr. Flamsteed; and in August 1690, he went to London to put it to the press, where the sheets were revised by Dr. Halley, who, at our author's request, gave leave for printing, in the appendix, his celebrated Theorem for finding the Foci of Optic Glasses. Accordingly the book came out, 1692, in 4to, under the title of Dioptrica Nova: a Treatise of Dioptrics, in two parts; wherein the various effects and appearances of spherical glasses, both convex and concave, single and combined, in telescopes and microscopes, together with their usefulness in many concerns of human life, are explained." He gave it the title of Dioptrica Nova, both because it was almost wholly new, very little being borrowed from other writers, and because it was the first book that appeared

in English upon the subject. The work contains several of the most generally useful propositions for practice, demonstrated in a clear and easy manner, for which reason it was for many years used by the artificers: and the second part is very entertaining, especially in the history which he gives of the several optical instruments, and of the discoveries made by them.

Before he left Chester he lost his lady, who died soon after she had brought him a son. Illness had deprived her of her eye-sight 12 years before, that is, soon after her marriage; from which time she had been very sickly, and afflicted with great pains in her head.

As soon as the public tranquillity was settled in his native country, he returned home; and, upon the convening of a new parliament in 1692, was chosen one of the representatives for the city of Dublin. In the next parliament, in 1695, he was chosen to represent the university there, and continued to do so to the end of his life; that learned body having lately conferred on him the degree of doctor of laws. He was likewise nominated by the lord-lieutenant one of the commissioners for the forfeited estates, to which employment was annexed a salary of 500l. a year; but looking upon it as an invidious office, he declined it.

In 1698, he published The Case of Ireland stated, in regard to its being bound by acts of Parliament made in England: in which it is supposed he has delivered all, or most, that can be said upon this subject, with great clearness and strength of reasoning.

Among many learned persons with whom he maintained correspondence and friendship, Mr. Locke was in a particular manner dear to him, as appears from their letters. In the above mentioned year, which was the last of our author's life, he made a journey to England, on purpose to pay a visit to that great man; and not long after his return to Ireland, he was seized with a fit of the stone, which terminated his existence.

Besides the three works already mentioned, viz. the Sciothericum Telescopium, the Dioptrica Nova, and the Case of Ireland stated; he published a great number of pieces in the Philosophical Transactions, which are contained in the volumes 14, 15, 16, 18, 19, 20, 21, 22, 23, 26, 29, several papers commonly in each volume.

Molyneux (Samuel), son of the former, was born at Chester in July 1689; and educated with great care by his father, according to the plan laid down by Locke on that subject. When his father died, he fell under the management of his uncle, Dr. Thomas Molyneux, an excellent scholar and physician at Dublin, and also an intimate friend of Mr. Locke, who executed his trust so well, that Mr. Molyneux became afterwards a most polite and accomplished gentleman, and was made secretary to George the 3d when prince of Wales. Astronomy and optics being his favourite studies, as they had been his father's, he projected many schemes for the advancement of them, and was particularly employed in the years 1723, 1724, and 1725, in perfecting the method of making telescopes; one of which instruments, of his own making, he had presented to John the 5th, king of Portugal.

Being soon after appointed a commissioner of the admiralty, he became so engaged in public affairs, that he had not leisure to pursue those enquiries any farther, as he intended. He therefore gave his papers to Dr. Robert Smith, professor of astronomy at Cambridge, whom he invited to make use of his house and apparatus of instruments, in order to finish what he had left imperfect. But Mr. Molyneux dying soon after, Dr. Smith lost the opportunity; he however supplied what was wanting from M. Huygens and others, and published the whole in his Complete Treatise of Optics.

MOMBAZA, or Monbaza, a town of Africa, in an island of the same name, with a castle and a fort; seated on the eastern coast, opposite to the country of Mombaza in Zanguebar, 70 miles south of Melinda, and subject to Portugal. Lon. 48. 0 E. Lat. 44. 0 N.

Mombaza, a country of Africa in Zanguebar, subject to the Portuguese, from whence they export slaves, gold, ivory, rice, flesh, and other provisions, with which they supply the settlements in Brasil. The king of this country being a Christian, had a quarrel with the Portuguese governor, took the castle by assault, turned Mahometan, and murdered all the Christians, in 1631; but in 1720 they became masters of the territory again.

MOME. *s.* A dull, stupid blockhead; a stock; a post (*Shakspeare*).

MO'MENT. *s.* (*moment*, Fr. *momentum*, Lat.) 1. Consequence; importance; weight; value (*Bentley*). 2. Force; impulsive weight; actuating power (*Ben Jonson*). 3. An indivisible particle of time (*Prior*).

Moment, in time, is sometimes taken for an extremely small part of duration; but, more properly, it is only an instant or termination or limit in time, like a point in geometry. Maclaurin's Fluxions, vol. 1, pa. 245.

Moments, in the new doctrine of infinites, denote the indefinitely small parts of quantity; or they are the same with what are otherwise called infinitesimals, and differences, or increments and decrements; being the momentary increments or decrements of quantity considered as in a continual flux.

Moments are the generative principles of magnitude: they have no determined magnitude of their own; but are only inceptive of magnitude.

Hence, as it is the same thing, if, instead of these moments, the velocities of their increases and decreases be made use of, or the finite quantities that are proportional to such velocities; the method of proceeding which considers the motions, changes, or fluxions of quantities, is denominated, by sir Isaac Newton, the Method of Fluxions.

Moment, in the doctrine of statics, denotes the product of any force into the perpen-

dicular distance of its direction from the body on which it acts.

MOME'NTALLY. *ad.* (from *momentum*, Lat.) For a moment (*Browne*).

MOMENTA'NEOUS. MO'MENTANY. *a.* (*momentaneus*, Lat. *momentanie*, French.) Lasting but a moment (*Bacon*).

MO'MENTARY. *a.* (from *moment.*) Lasting for a moment; done in a moment (*Dryden*).

MO'MENTOUS. *a.* (from *momentum*, Latin.) Important; weighty; of consequence (*Addison*).

MOMENTUM, in mechanics, signifies the same with impetus, or the quantity of motion in a moving body; which is always equal to the quantity of matter multiplied into the velocity; or, which is the same thing, it may be considered as a rectangle under the quantity of matter and velocity. See FORCE, QUANTITY OF MOTION, and DYNAMICS.

MOMO'RDICA. Male balsam apple. In botany, a genus of the class monoecia, order triandria. Male: calyx five-cleft; coral five-parted, filaments three; anthers cohering. Fem. calyx five-cleft; corol five-parted; styles three-cleft; pome opening elastically, three-celled. Eight species: the following are the chief.

1. M. balsamina. Common balsam apple. Fruit angular, tubercled; leaves glabrous, deeply cut in a spreading palmate manner, trailing melon-like stem, sending out many side-branches with tendrils. A native of India, flowering in June and July. The Indians employ it as a vulnerary; for which purpose they cut open the unripe fruit, and infuse it in sweet oil, which they expose to the sun for some days till it acquires a red colour. The oil thus prepared is applied to wounds by being dropped on cotton, and is esteemed the best traumatic next to the balsam of Mecca.

2. M. charantia. Hairy momordica. Fruit angular, tubercled, white, yellow or green on the outside; within, very red and fleshy, one-celled, bursting elastically: a native of the East Indies; flowers in June and July.

3. M. luffa. Egyptian momordica. Fruit oblong, hairy, with chain-like angles, three-celled, with a white flaccid esculent pulp, of an insipid flavour. A native of Arabia and the East Indies: flowers in July and August.

4. M. elaterium. Elastic momordica. Officinal elaterium. Fruit oblong, smooth, bristly: does not change its colour; but when ripe quits the peduncle, and casts out the seeds and juices with great violence. It is the dried juice of the fruit that forms the elaterium of the shops, and is the most powerful cathartic in the whole materia medica. See ELATERIUM and CUCUMIS AGRESTIS.

All these plants may be propagated by sowing the seeds in hot-beds in the same manner as cucumber-seeds; and they require the same attention as the cucumber plant afterwards. The first three sorts are ornamental stove plants; the last will thrive in open borders.

MOMOTUS. Motmot. In zoology, a genus of the class aves, order picæ. Bill strong, slightly curved, serrate at the edges; nostrils feathered, tongue feathered; tail wedged, feet gressorial. One species only, M. Brasiliensis, Brasilian motmot, affording two varieties. The one is ornamented with a bright green above, below with a more obscure shade of the same colour: size that of a pie, or about seventeen inches from the tip of the bill to that of the tail: bill conic, bent a little downwards, and serrated upon the edges of both mandibles: toes three before and one behind; fore-toes closely united almost the whole length. The other variety differs more considerably in its colours. Both are distinguished from all other birds by having the two middle feathers of the tail quite naked of their vanes for about an inch, at a small distance from their extremity.

Some have imagined that this nakedness of the feathers of the tail of this bird was not the production of nature, but was owing to the caprice of the animal in tearing away the vanes from that part of the stalk which is seen bare. In the young of this genus, however, naturalists have observed that the vanes of these feathers are quite entire, and that, as they advance to their adult state, they gradually grow shorter and shorter, till at last, in old age, they altogether disappear.

These birds inhabit South America: they are very difficult to tame, because they live upon insects, which cannot easily be procured suitable to their taste. They are extremely shy and timid when old; and, if then in captivity, invariably refuse all kinds of food. From their solitary habits, they never go in flocks, nor even in pairs; and are hardly ever seen but in the midst of large forests, where they hop among the lower branches, or upon the ground. They are almost altogether incapable of flight, and therefore generally build their nests upon the ground in the deserted holes of some of the smaller quadrupeds. The nest consists of a few withered blades of grass, on which they deposite their eggs to the number of two. These birds are described by Edwards under the name of Brasilian saw-billed rollers; and by Marcgrave in his Natural History of Brasil they are called guira-guainumbi.

MOMUS, the god of pleasantry among the ancients, son of Nox, according to Hesiod. He was continually employed in satirizing the gods, and whatever they did was freely turned into ridicule. Vulcan, Minerva, Venus, &c. all alike experienced the shafts of his censure and ridicule. Such liberal reflections, however, upon the gods were the cause that Momus was driven from heaven. He is generally represented raising a mask from his face, and holding a small figure in his hand.

MONA, an island between Britain and Hibernia, anciently inhabited by a number of Druids. It is supposed by some to be the modern island of Anglesey, and by others the island of Man.

MONA, an island of the Baltic Sea, south-west of the island of Zealand, subject

to Denmark. Lon. 12. 30 E. Lat. 55. 20 N.

MONA. See INCHCOLM.

MO'NACHAL. *a.* (*monacal*, French.) Monastic; relating to monks, or conventual orders.

MO'NACHISM. *s.* (*monachisme*, French.) The state of monks; the monastic life.

MO'NACO, a small but handsome and strong town of Italy, in the territory of Genoa, with a castle, citadel, and a good harbour. It is seated on a craggy rock, and has its own prince, under the protection of France. Lon. 7. 33 E. Lat. 43. 48 N.

MO'NAD. MO'NADE. *s.* (μονὰς.) An indivisible thing. See LEIBNITZIAN PHILOSOPHY.

MONADELPHIA. (μονος and αδελφος, one brotherhood.) The name of the sixteenth class in the Linnéan system of botany. Comprehending those plants which have hermaphrodite flowers, with one set of united stamens. They form a natural class, entitled columniferæ.

MONAGHAN, a county of Ireland, situated in the province of Ulster, is bounded by Tyrone on the north, Armagh on the east, Cavan and Louth on the south, and Fermanagh on the west. It is a boggy and mountainous tract, but in some places is well improved. It contains 170,090 Irish plantation acres, 24 parishes, five baronies, and one borough, and sends four members to parliament. It is about 30 miles long and 22 broad. The linen trade of this county is averaged at 104,000l. yearly.

MONAGHAN, a post, fair, and market town, and chief of the county of that name, is distant 62 miles from Dublin; it is a borough, and returns two members to parliament; patron lord Clermont. It gives title of baron to the family of Blayney, and has six fairs. It was anciently called Muinechan. An abbey was founded here in a very early age, of which Moelodius the son of Aodh was abbot. In 1462 a monastery for conventual Franciscans was erected on the site of this abbey, which was granted on the general suppression of monasteries to Edward Withe, and a castle has been since erected on the site by Edward lord Blayney.

MONAMY (P.), a good painter of sea-pieces, was born in Jersey; and certainly (says Mr. Walpole), from his circumstances, or the views of his family, he had little reason to expect the fame he afterwards acquired, having received his first rudiments of drawing from a sign and house painter on London-bridge. But when nature gives real talents, they break forth in the homeliest school. The shallow waves that rolled under his window taught young Monamy what his master could not teach him, and fitted him to imitate the turbulence of the ocean. In Painters' hall is a large piece by him, painted in 1726. He died at his house in Westminster the beginning of 1749.

MONANDRIA. (from μονος, alone, and ανηρ, a man or husband.) The name of the first class in the Linnéan system of botany, comprehending those plants which have only one stamen in a hermaphrodite flower.

MO'NARCH. *s.* (μόναρχος.) 1. A governour invested with absolute authority; a king (*Temple*). 2. One superiour to the rest of the same kind. 3. President (*Shakspeare*).

MONA'RCHAL. *a.* (from *monarch.*) Suiting a monarch; regal; princely; imperial (*Milton*).

MONA'RCHICAL. *a.* (μοναρχικὸς.) Vested in a single ruler (*Brown*).

To MO'NARCHISE. *v. n.* (from *monarch.*) To play the king (*Shakspeare*).

MONARCHY, a large state governed by one; or a state where the supreme power is lodged in the hands of a single person. The word comes from the Greek μοναρχης, one who governs alone; formed of μονος, *solus*, and αρχη, *imperium*, government." Of the three forms of government, viz. democracy, aristocracy, and monarchy, the last is the most powerful, all the sinews of government being knit together, and united in the hand of the prince; but then there is imminent danger of his employing that strength to improvident or oppressive purposes. As a democracy is the best calculated to direct the end of a law, and an aristocracy to invent the means by which that end shall be obtained, a monarchy is most fit for carrying those means into execution.

The most ancient monarchy was that of the Assyrians, which was founded soon after the deluge. We usually reckon four grand or universal monarchies; the Assyrian, Persian, Grecian, and Roman; though St. Augustine makes them but two, viz. those of Babylon and Rome. Belus is placed at the head of the series of Assyrian kings who reigned at Babylon, and is by profane authors esteemed the founder of it, and by some the same whom the scriptures call Nimrod. The principal Assyrian kings after Belus were, Ninus, who built Nineveh, and removed the seat of empire to it; Semiramis, who, disguising her sex, took possession of the kingdom instead of her son, and was killed, and succeeded by her son Ninyas; and Sardanapalus, the last of the Assyrian monarchs, and more effeminate than a woman. After his death the Assyrian empire was split into three separate kingdoms, viz. the Median, Assyrian, and Babylonian. The first king of the Median kingdom was Arbaces; and this kingdom lasted till the time of Astyages, who was subdued and divested of his kingdom by Cyrus.

In the time of Cyrus there arose a new and second monarchy called the Persian, which stood upwards of 200 years from Cyrus, whose reign began A. M. 3468, to Darius Codomannus, who was conquered by Alexander, and the empire translated to the Greeks A. M. 3674. The first monarch was Cyrus, founder of the empire. 2. Cambyses, the son of Cyrus. 3. Smerdis. 4. Darius, the son of Hystaspes, who reigned 521 years before Christ. 5. Xerxes, who reigned 485 years before Christ. 6. Artaxerxes Longimanus, who reigned 464 years before Christ. 7. Xerxes the second. 8. Ochus, or Darius, called Nothus, 424 years before Christ. 9. Artaxerxes Mnemon, 405

years before Christ. 10. Artaxerxes Ochus, 359 years before Christ. 11. Arses, 338 years before Christ. 12. Darius Codomannus, 336 years before Christ, who was defeated by Alexander the Great, and deprived of his kingdom and life about 331 years before Christ: the dominion of Persia after his death was translated to the Greeks.

The third monarchy was the Grecian. As Alexander, when he died, did not declare who should succeed him, there started up as many kings as there were commanders. At first they governed the provinces that were divided among them under the title of viceroys; but when the family of Alexander the Great was extinct, they took upon them the name of kings. Hence, in process of time, the whole empire of Alexander produced four distinct kingdoms, viz. 1. The Macedonian; the kings of which, after Alexander, were Antipater, Cassander, Demetrius, Poliorcetes, Seleucus Nicanor, Meleager, Antigonus Doson, Philip, and Perseus, under whom the Macedonian kingdom was reduced to the form of a Roman province. 2. The Asiatic kingdom, which upon the death of Alexander fell to Antigonus, comprehending that country now called Natolia, together with some other regions beyond Mount Tarus. From this kingdom proceeded two lesser ones, viz. that of Pergamus, whose last king, Attalus, appointed the Roman people to be his heir; and Pontus, reduced by the Romans into the form of a province, when they had subdued the last king Mithridates. 3. The Syrian, of whose twenty-two kings the most celebrated were, Seleucus Nicanor, founder of the kingdom; Antiochus Deus; Antiochus the Great; Antiochus Epiphanes; and Tigranes, who was conquered by the Romans under Pompey; and Syria reduced into the form of a Roman province. 4. The Egyptian, which was formed by the Greeks in Egypt, and flourished near 240 years under 12 kings, the principal of whom were Ptolemy Lagus, its founder; Ptolemy Philadelphus, founder of the Alexandrian library; and queen Cleopatra, who was overcome by Augustus, in consequence of which Egypt was added to the dominion of the Romans.

The fourth monarchy was the Roman, which lasted 244 years, from the building of the city until the time when the royal power was abrogated. The kings of Rome were, Romulus, its founder; Numa Pompilius; Tullus Hostilius; Anens Martius; Tarquinius Priscus; Servius Tullius; and Tarquin the Proud, who was banished, and with whom terminated the regal power.

There seems in reality no necessity to make the Medes, Persians, and Greeks succeed to the whole power of the Assyrians, to multiply the number of the monarchies. It was the same empire still; and the several changes that happened in it did not constitute different monarchies. Thus the Roman empire was successively governed by princes of different nations, yet without any new monarchy being formed thereby. Rome, therefore, may be said to have immediately succeeded Babylon in the empire of the world. See EMPIRE.

Of monarchies some are absolute and despotic, where the will of the monarch is uncontroulable: others are limited, where the prince's authority is restrained by laws, and part of the supreme power lodged in other hands, as in Britain. (See GOVERNMENT.) Some monarchies again are hereditary, where the succession devolves immediately from father to son; and others are elective, where, on the death of the monarch, his successor is appointed by election, as was formerly the case in Poland.

MONARCHY MEN (Fifth), in the ecclesiastical history of England, were a set of wrong-headed and turbulent enthusiasts who arose in the time of Cromwell, and who expected Christ's sudden appearance upon earth to establish a new kingdom; and acting in consequence of this illusion, aimed at the subversion of all human government.

MONARDA. American field-basil. In botany, a genus of the class diandria, order monogynia. Corol unequal, upper lip linear, involving the filament; seeds four. Seven species; those chiefly cultivated are,

1. M. fistulosa. Purple monarda, with capitate, purple flowers. America.

2. M. oblongata. Long-leaved monarda, with ovate leaves a little tapering at the base. A native of Canada.

3. M. didyma. Scarlet monarda, which is the species chiefly valued, and by far the most ornamental of the whole. Root perennial; stems about two feet high, smooth, acute-angled; leaves ovate, glabrous, which when bruised emit a very grateful refreshing odour; flowers in whorls, and didynamous, of a bright red colour. They appear in July, and on a moist soil will continue till the middle or end of September. It is a native of America.

All these plants may be increased by parting the roots, and some of them by slips and cuttings as well as seeds.

MONARDES (Nicholas), an excellent Spanish physician of Seville, who lived in the 16th century, and deservedly acquired great reputation by his practical skill, and the books which he wrote. His Spanish works have been translated into Latin by Clusius, into Italian by Annibal Brigantus, and those upon American drugs have appeared in English. He died about the year 1578.

MONAS, in zoology, a genus of the class vermes, order infusoria. Worm invisible to the naked eye, most simple, pellucid, resembling a point. Five species.

1. M. atomus. Whitish, with a variable point. Found in sea-water kept a long time; with a minute black dot, sometimes two, variable in position.

2. M. punctum. A solid opake black point. Found in fetid infusions of pears, moving in a slow wavering manner.

3. M. mica. Transparent, with an oval, moveable circle in the middle. Common in purer waters.

4. M. lens. Transparent, with sometimes a greenish margin. Found in all waters; a round pellucid dot, frequently in masses, without the least vestige of intestines.

5. M. termo. A most minute, simple gelatinous point; found in most animal and vegetable infusions: of all known animals the most minute and simple, being so extremely delicate and transparent as often to elude the most highly magnifying powers, blending, as it were, in the water in which it swims.

MONASTER, an ancient town of the kingdom of Tunis, seated near the sea, 70 miles S.E. of Tunis. Lon. 11. 6 E. Lat. 35. 50 N.

MONASTERY, a convent, or house built for the reception of religious; whether it be abbey, priory, nunnery, or the like.

MONASTERY is only properly applied to the houses of monks, mendicant friars, and nuns. The rest are more properly called religious houses.

The houses belonging to the several religious orders which obtained in England and Wales were cathedrals, colleges, abbeys, priories, preceptories, commandries, hospitals, frieries, hermitages, chantries, and free chapels. These were under the direction and management of various officers. The dissolution of houses of this kind began so early as the year 1312, when the Templars were suppressed; and in 1323 their lands, churches, advowsons, and liberties, here in England, were given, by 17 Ed. II. stat. 3. to the prior and brethren of the hospital of St. John at Jerusalem. In the years 1390, 1437, 1441, 1459, 1497, 1505, 1508, and 1515, several others houses were dissolved, and their revenues settled on different colleges in Oxford and Cambridge. Soon after the last period, cardinal Wolsey, by licence of the king and pope, obtained a dissolution of above thirty religious houses for the founding and endowing his colleges at Oxford and Ipswich. About the same time a bull was granted by the same pope to cardinal Wolsey, to suppress monasteries, where there were not above six monks, to the value of eight thousand ducats a year, for endowing Windsor, and King's College in Cambridge; and two other bulls were granted to cardinals Wolsey and Campeius, where there were less than twelve monks, and to annex them to the greater monasteries; and another bull to the same cardinals to enquire about abbeys, to be suppressed, in order to be made cathedrals. Although nothing appears to have been done in consequence of these bulls, the motive which induced Wolsey, and many others, to suppress these houses, was the desire of promoting learning; and archbishop Cranmer engaged in it with a view of carrying on the reformation. There were other causes that concurred to bring on their ruin: many of the religious were loose and vicious; the monks were generally thought to be, in their hearts, attached to the pope's supremacy; their revenues were not employed according to the intent of the donors; many cheats in images, feigned miracles, and counterfeit relics, had been discovered, which had brought the monks into disgrace; the Observant friars had opposed the king's divorce from queen Catharine; and these circumstances operated, in concurrence with the king's want of a supply, and the people's desire to save their money, to forward a motion in parliament, that in order to support the king's state, and supply his wants, all the religious houses might be conferred upon the crown, which were not able to spend above 200*l.* a year; and an act was passed for that purpose, 27 Henry VIII. c. 28. By this act about three hundred and eighty houses were dissolved, and a revenue of 30 or 32,000*l.* a year came to the crown; besides about 100,000*l.* in plate and jewels. The suppression of these houses occasioned discontent, and at length an open rebellion: when this was appeased, the king resolved to suppress all the rest of the monasteries, and appointed a new visitation; which caused the greater abbeys to be surrendered apace; and it was enacted by 31 Hen. VIII. c. 13. that all monasteries, &c. which have been surrendered since the fourth of February, in the twenty-seventh year of his majesty's reign, and which hereafter shall be surrendered, shall be vested in the king. The knights of St. John of Jerusalem were also suppressed by the 32 Henry VIII. c. 24. The suppression of these greater houses by these two acts produced a revenue to the king of above 100,000*l.* a year, besides a large sum in plate and jewels. The last act of dissolution in this king's reign was the act of 37 Hen. VIII. c. 4. for dissolving colleges, free chapels, chantries &c. which act was farther enforced by 1 Edw. VI. c. 14. By this act were suppressed ninety colleges, a hundred and ten hospitals, and two thousand three hundred and seventy-four chantries and free chaples. The number of houses and places suppressed from first to last, so far as any calculations appear to have been made, seems to be follows:

Of lesser monasteries, of which we have the valuation	374
Of greater monasteries	186
Belonging to the Hospitallers	48
Colleges	90
Hospitals	110
Chantries and free chapels	2374
Total	3182

Besides the friars houses, and those suppressed by Wolsey, and many small houses, of which we have no particular account.

The sum total of the clear yearly revenue of the several houses at the time of their dissolution, of which we have any account, seems to be as follows:

	£.	s.	d.
Of the greater monasteries	104919	13	3¼
Of all those of the lesser monastries of which we have the valuation	29702	1	10½
Knights Hospitallers head house in London	2385	12	8
We have the valuation of only 28 of their houses in the country	3026	9	5
Friars houses, of which we have the valuation	75	1	2 0¼
Total	140784	19	3

If proper allowances are made for the lesser monasteries, and houses not included in this estimate, and for the plate, &c. which came into the hands of the king by the dissolution, and for the value of money at that time, which was at least six times as much as at present; and also consider that the estimate of the lands was generally supposed to be much under the real worth, we must conclude their whole revenues to have been immense.

It does not appear that any computation has been made of the number of persons contained in the religious houses.

Those of the lesser monasteries dissolved by 27 Hen. VIII. were reckoned at about - - -	10,000
If we suppose the colleges and hospitals to have contained a proportionable number, these will make about	5347
If we reckon the number in the greater monasteries, according to the proportion of their revenues, they will be about 35,000; but as probably they had larger allowances in proportion to their number than those of the lesser monasteries, if we abate upon that account 5000, they will then be - - -	30,000
One for each chantry and free chapel - - - - -	2374
Total	47,721

But as there were probably more than one person to officiate in several of the free chapels, and there were other houses which are not included within this calculation, perhaps they may be computed in one general estimate at about 50,000. As there were pensions paid to almost all those of the greater monasteries, the king did not immediately come into the full enjoyment of their whole revenues: however, by means of what he did receive, he founded six new bishoprics, viz. those of Westminster (which was changed by queen Elizabeth into a deanry, with twelve prebends, and a school), Peterborough, Chester, Gloucester, Bristol, and Oxford. And in eight other sees he founded deanries and chapters, by converting the priors and monks into deans and prebendaries, viz. Canterbury, Winchester, Durham, Worcester, Rochester, Norwich, Ely, and Carlisle. He founded also the colleges of Christ-church in Oxford, and Trinity, Cambridge, and finished King's college there. He likewise founded professorships of divinity, law, physic, and of the Hebrew and Greek tongues, in both the said universities. He gave the house of Grey Friars, and St. Bartholomew's hospital, to the city of London; and a perpetual pension to the poor knights of Windsor, and laid out great sums in building and fortifying many ports in the channel. It is observable, upon the whole, that the dissolution of these houses was an act, not of the church, but of the state; in the period preceding the reformation, by a king and parliament of the Roman catholic communion, in all points except the king's supremacy; to which the pope himself, by his bulls and licences, had led the way. See Tanner's Notitia Monastica; and for an abstract, Burn's Eccl. Law, art. Monasteries.

MONA'STICAL. Mona'stic. *a.* (*monasticus*, Latin.) Religiously recluse; pertaining to a monk (*Brown*).

MONA'STICALLY, *ad.* Reclusely; in the manner of a monk (*Swift.*)

MONAULOS. (Greek.) A kind of single flute, of higher antiquity than even the lyre, and said by some writers to have been invented in Egypt. The Egyptians called it Photinx, or crooked flute: its shape was crooked, and something like that of a bull's horn.

MONCALLIER, a town of Piedmont, seated on the Po, five miles S.E. of Turin. Lon. 7. 48 E. Lat. 45. 2 N.

MONCALVO, a strong town of Italy, in Montferrat, seated on a mountain, 12 miles S.W. of Cassel. Lon. 7. 19 E. Lat. 45. 10 N.

MO'NDAY. *s.* (from *moon* and *day.*) The second day of the week.

MONETARIUS, or Moneyer, a name which antiquaries and medalists give to those who struck the ancient coins or moneys. Many of the old Roman and other coins have the name of the monetarius, either written at length, or at least the initial letters of it. See Medal.

MONE'TIA, in botany, a genus of the class tetrandria, order monogynia; calyx four-cleft; petals four, linear; berry two-celled, with a single seed in each. One species only; a prickly shrub of the East Indies, with spines in fours, and opposite leaves glabrous on both sides; flowers axillary and sessile.

MONEY, a piece of matter, commonly metal, to which public authority has affixed a certain value and weight to serve as a medium in commerce. See Coin, Commerce, and Medals.

Money is usually divided into real or effective, and imaginary or money of account.

I. Real money.

History of real money. Real money includes all coins, or species of gold, silver, copper, and the like; which have course in common, and do really exist. Such are guineas, pistoles, pieces of eight, ducats, &c.

Real money, civilians observe, has three essential qualities, viz. matter, form, and weight or value.

For the matter, copper is that thought to have been first coined; afterwards silver: and lastly gold, as being the most beautiful, scarce, cleanly, divisible, and pure of all metals.

The degrees of goodness are expressed in gold by carats; and in silver by pennyweights, &c. For there are several reasons for not coining them pure and without alloy, viz. the great loss and expence in refining them, the necessity of hardening them to make them more durable, and the scarcity of gold and silver in most countries. See Alloy.

Among the ancient Britons, iron rings, or, as some say, iron plates, were used for money; among the Lacedemonians, iron bars quenched with vinegar, that they might not serve for any other use. Seneca observes, that there was anciently stamped money of leather, *corium forma publica impressum*. And the same thing was put in practice by Frederic II. at the siege of Milan;

to say nothing of an old tradition among ourselves, that in the confused times of the barons wars the like was done in England: but the Hollanders, we know, coined great quantities of paste-board in the year 1574.

As to the form of money, it has been more various than the matter. Under this are comprehended the weight, figure, impression, and value.

For the impression, the Jews, though they detested images, yet stamped on the one side of their shekel the golden pot which had the manna, and on the other Aaron's rod. The Dardans stamped two cocks fighting. The Athenians stamped their coins with an owl, or an ox; whence the proverb on bribed lawyers, *Bos in lingua*. They of Ægina, with a tortoise; whence that other saying, *Virtutem et sapientiam vincunt testudines*. Among the Romans, the monetarii sometimes impressed the images of men that had been eminent in their families on the coins: but no living man's head was ever stamped on a Roman coin till after the fall of the commonwealth. From that time they bore the emperor's head on one side. From this time the practice of stamping the prince's image on coins has obtained among all civilized nations; the Turks and other Mahometans alone excepted, who, in detestation of images, inscribe only the prince's name, with the year of the transmigration of their prophet.

As to the figure, it is either round, as in Britain; multangular or irregular, as in Spain; square, as in some parts of the Indies; or nearly globular, as in most of the rest.

After the arrival of the Romans in this island, the Britons imitated them, coining both gold and silver with the images of their kings stamped on them. When the Romans had subdued the kings of the Britons, they also suppressed their coins, and brought in their own; which were current here from the time of Claudius to that of Valentinian the younger, about the space of 500 years.

Mr. Camden observes, that the most ancient English coin he had known was that of Ethelbert king of Kent, the first christian king in the island; in whose time all money accounts begin to pass by the names of pounds, shillings, pence, and mancuses. Pence seems borrowed from the Latin *pecunia*, or rather from *pendo*, on account of its just weight, which was about threepence of our money. These were coarsely stamped with the king's image on the one side, and either the mint-master's, or the city's where it was coined, on the other. Five of these pence made their schilling, probably so called from *scilingus*, which the Romans used for the fourth part of an ounce. Forty of these schillings made their pound; and 400 of these pounds were a legacy, or a portion for a king's daughter, as appears by the last will of king Alfred. By these names they translated all sums of money in their old English testament; talents by *pundes*; Judas's thirty pieces of silver by *thirtig scillinga*; tribute-money, by *penining*: the mite by *feorthling*.

But it must be observed, they had no other real money, but pence only; the rest being imaginary moneys, i. e. names of numbers or weights. Thirty of these pence made a mancus, which some take to be the same with a mark; manca as appears by an old MS. was *quinta pars unciæ*. These mancas or mancuses were reckoned both in gold and silver. For in the year 680 we read that Ina king of the West Saxons obliged the Kentish men to buy their peace at the price of 30,000 mancas of gold. In the notes on king Canute's laws, we find this distinction, that *mancusa* was as much as a mark of silver; and *manca* a square piece of gold, valued at 30 pence.

The Danes introduced a way of reckoning money by ores, *per oras*, mentioned in Domesday-book; but whether they were a several coin, or a certain sum, does not plainly appear. This, however, may be gathered from the Abbey-book of Burton, that 20 ores were equivalent to two marks. They had also a gold coin called *byzantine* or *bezant*, as being coined at Constantinople, then called *Byzantium*. The value of which coin is not only now lost, but was so entirely forgot even in the time of king Edward III. that whereas the bishop of Norwich was fined a byzantine of gold to be paid the abbot of St. Edmund's Bury for infringing his liberties (as it had been enacted by parliament in the time of the Conqueror), no man then living could tell how much it was: so it was referred to the king to rate how much he should pay. Which is the more unaccountable, because but 100 years before, 200,000 bezants were exacted by the soldan for the ransom of St. Louis of France; which were then valued at 100,000 livres.

Though the coining of money be a special prerogative of the king, yet the ancient Saxon princes communicated it to their subjects, insomuch that in every good town there was at least one mint; but at London eight; at Canterbury four for the king, two for the archbishop, one for the abbot at Winchester, six at Rochester, at Hastings two, &c.

The Norman kings continued the same custom of coining only pence, with the prince's image on one side, and on the other the name of the city where it was coined, with a cross so deeply impressed, that it might be easily parted and broke into two halves, which, so broken, they called halfpence; or into four parts, which they called fourthings or farthings.

In the time of king Richard I. money coined in the east parts of Germany came in special request in England on account of its purity, and was called easterling money, as all the inhabitants of those parts were called Easterlings. And shortly after, some of those people skilled in coining were sent for hither, to bring the coin to perfection; which since has been called sterling for Easterling. See STERLING.

King Edward I. who first adjusted the measure of an ell by the length of his arm, herein imitating Charles the Great, was the first also who established a certain standard for the coin, which is expressed to this effect by Greg. Rockley, mayor of London, and mint-master.—"A pound of money containeth twelve ounces: in a pound there ought to be eleven ounces, two easterlings, and one farthing; the rest alloy. The said pound ought to weigh twenty shillings and three-pence in account and weight. The ounce ought to weigh twenty pence, and a penny twenty-four grains and a half. Note, that eleven ounces two-pence sterling ought to be of pure silver, called leaf-silver; and the minter must add of other weight seventeen-pence halfpenny farthing, if the silver be so pure."

About the year 1320 the states of Europe first began to coin gold; and among the rest our king Edward III. The first pieces he coined were called florences, as being coined by Florentines; afterwards he coined nobles; then rose-nobles, current at 6s. and 8d. half-nobles called half-pennies,

at 5s. and 4d. of gold; and quarters at 20d. called farthings of gold.—The succeeding kings coined rose-nobles, and double rose-nobles, great sovereigns, and half Henry nobles, angels, and shillings.

King James I. coined unites, double crowns, Britain crowns; then crowns, half-crowns, &c.

2. *Comparative value of money and commodities at different periods.*—The English money, though the same names do by no means correspond with the same quantity of precious metal as formerly, has not changed so much as the money of most other countries. From the time of William the Conqueror, the proportion between the pound, the shilling, and the penny, seems to have been uniformly the same as at present.

Edward III. as already mentioned, was the first of our kings that coined any gold; and no copper was coined by authority before James I. These pieces were not called farthings, but farthing tokens, and all people were at liberty to take or refuse them. Before the time of Edward III. gold was exchanged, like any other commodity, by its weight; and before the time of James I. copper was stamped by any one person who chose to do it.

In the year 712 and 727, an ewe and lamb were rated at 1s. Saxon money till a fortnight after Easter. Between the years 900 and 1000, two hides of land, each containing about 120 acre , were sold for 100 shillings. In 1000, by king Ethelred's laws, a horse was rated at 30s. a mare, or a colt of a year old, at 20s. a mule, or young ass, at 12s. an ox at 30s. a cow at 24s. a swine at 8d. sheep at 1s. In 1043, a quarter of wheat was sold for 60d. Hence it is computed, that in the Saxon times there was ten times less money, in proportion to commodities, than at present. Their nominal specie, therefore, being about three times higher than ours, the price of every thing, according to our present language, must be reckoned thirty times cheaper than it is now.

In the reign of William the Conqueror, commodities were ten times cheaper than they are at present; from which we cannot help forming a very high idea of the wealth and power of that king: for his revenue was 400,000l. per annum, every pound being equal to that weight of silver, consequently the whole may be estimated at 1,200,000l. of the present computation; a sum which, considering the different value of money between that period and the present, was equivalent to 12,000,000l. of modern estimation.

The most necessary commodities do not seem to have advanced their price from William the Conqueror to Richard I.

The price of corn in the reign of Henry III. was near half the mean price in our times. Bishop Fleetwood has shown, that in the year 1240, which was in this reign, 4l. 13s. 9d. was worth about 50l. of our present money. About the latter end of this reign, Robert de Hay, rector of Souldern, agreed to receive 100s. to purchase to himself and successor the annual rent of 5s. in full compensation of an acre of corn.

Butcher's meat, in the time of the great scarcity in the reign of Edward II. was, by a parliamentary ordinance, sold three times cheaper than our mean price at present; poultry somewhat lower, because, being now considered as a delicacy, it has risen beyond its proportion. The mean price of corn at this period was half the present value, and the mean price of cattle one-eighth.

In the next reign, which was that of Edward III. the most necessary commodities were in general about three or four times cheaper than they are at present.

In these times, knights who served on horseback in the army had 2s. a day, and a foot archer 6d. which last would now be equal to a crown a day. This pay has continued nearly the same nominally (only that in the time of the commonwealth the pay of the horse was advanced to 2s. 6d. and that of the foot 1s. though it was reduced again at the Restoration), but soldiers were proportionably of a better rank formerly.

In the time of Henry VI. corn was about half its present value, other commodities much cheaper. Bishop Fleetwood has determined, from a most accurate consideration of every circumstance, that 3l. in this reign was equivalent to 28l. or 30l. now.

In the time of Henry VII. many commodities were three times as cheap here, and in all Europe, as they are at present, there having been a great increase of gold and silver in Europe since his time, occasioned by the discovery of America.

The commodities whose price has risen the most since before the time of Henry VII. are butchers' meat, fowls, and fish, especially the latter. And the reason why corn was always much dearer in proportion to other eatables, according to their prices at present, is, that in early times agriculture was little understood. It required more labour and expence, and was more precarious than it is at present. Indeed, notwithstanding the high price of corn in the times we are speaking of, the raising of it so little answered the expence, that agriculture was almost universally quitted for grazing; which was more profitable, notwithstanding the low price of butchers' meat. So that there was constant occasion for statutes to restrain grazing, and to propagate agriculture; and no effectual remedy was found till the bounty upon the exportation of corn; since which, above ten times more corn has been raised in this country than before.

The price of corn in the time of James I. and consequently that of other necessaries of life, was not lower, but rather higher, than at present: wool is not two-thirds of the value it was then; the finer manufactures having sunk in price by the progress of art and industry, notwithstanding the increase of money. Butchers' meat was higher than at present. Prince Henry made an allowance of near 4d. per pound for all the beef and mutton used in his family. This may be true with respect to London; but the price of butchers' meat in the country, which does not even now much exceed this price at a medium, has certainly greatly increased of late years, and particularly in the northern counties.

The prices of commodities are higher in England than in France; besides that the poor people of France live upon much less than the poor in England, and their armies are maintained at less expence. It is computed by Mr. Hume, that a British army of 20,000 men is maintained at near as great an expence as 60,000 in France, and that the English fleet, in the war of 1741, required as much money to support it as all the Roman legions in the time of the emperors. However, all that we can conclude from this is, that money is much more plentiful in Europe at present than it was in the Roman empire.

In the 13th century the common interest which the Jews had for their money, Voltaire

says, was 20 per cent. But with regard to this, we must consider the great contempt that nation was always held in, the large contributions they were frequently obliged to pay, the risk they ran for never receiving the principal, the frequent confiscations of all their effects, and the violent persecutions to which they were exposed; in which circumstances it was impossible for them to lend money at all, unless for most extravagant interest, and much disproportioned to its real value. Before the discovery of America, and the plantation of our colonies, the interest of money was generally 12 per cent. all over Europe; and it has been growing gradually less since that time, till it is now generally about four or five.

When sums of money are said to be raised by a whole people, in order to form a just estimate of it we must take into consideration not only the quantity of the precious metal according to the standard of the coin, and the proportion of the quantity of coin to the commodities, but also the number and riches of the people who raise it: for populous and rich countries will much more easily raise any certain sum of money than one that is thinly inhabited, and chiefly by poor people. This circumstance greatly adds to our surprise at the vast sums of money raised by William the Conqueror, who had a revenue nearly in value equal to 12,000,000l. of our money (allowance being made for the standard of coin and the proportion it bore to commodities), from a country not near so populous or rich as England is at present. Indeed, the accounts historians give us of the revenues of this prince, and the treasure he left behind him, are barely credible.

II. Imaginary money, or *Money of account*, is that which has never existed, or at least which does not exist in real specie, but is a denomination invented or retained to facilitate the stating of accounts, by keeping them still on a fixed footing, not to be changed, like current coins, which the authority of the sovereign raises or lowers according to the exigences of the state. Of which kind are pounds, livres, marks, maravedies, &c.

Money of account among the ancients.—1. The Grecians reckoned their sums of money by *drachma*, *minæ*, and *talenta*. The drachma was equal to 7$\frac{3}{4}$d. sterling; 100 drachmæ made the mina, equal to 3l. 4s. 7d. sterling; 60 minæ made the talent, equal to 193l. 15s. sterling: hence 100 talents amounted to 19,375l. sterling. The mina and talentum, indeed, were different in different provinces: their proportions in Attic drachms are as follow. The Syrian mina contained 25 Attic drachms; the Ptolemaic 33$\frac{1}{3}$; the Antiochic and Eubæan 100; the Babylonic 116; the greater Attic and Tyrian 133$\frac{1}{3}$; the Æginean and Rhodian 166$\frac{2}{3}$. The Syrian talent contained 15 Attic minæ; the Ptolemaic 20; the Antiochic 60: the Eubæan 60; the Babylonic 70; the greater Attic and Tyrian 80; the Æginean and Rhodian 100.

2. Roman moneys of account were the *sestertius* and *sestertium*. The sestertius was equal to 1d. 3$\frac{3}{4}$q. sterling. One thousand of these made the sesterium equal to 8l. 1s. 5d. 2q. sterling. One thousand of these sestertia made the decies sestertium (the adverb *centies* being always understood) equal to 8072l. 18s. 4d. sterling. The decies sestertium they also called *decies centena millia nummum*. Centies sestertium, or centies HS, were equal to 80,729l. 3s. 4d. Millies HS to 807,291l. 13s. 4d. Millies centies HS to 888,020l. 1s. 8d.

THEORY OF MONEY.

1. *Of artificial or material money.*

I. As far back as our accounts of the transactions of mankind reach, we find they had adopted the precious metals, that is, silver and gold, as the common measure of value, and as the adequate equivalent for every thing alienable.

The metals are admirably adapted for this purpose: they are perfectly homogeneous: when pure, their masses, or bulks, are exactly in proportion to their weights: no physical difference can be found between two pounds of gold or silver, let them be the production of the mines of Europe, Asia, Africa, or America: they are perfectly malleable, fusible, and suffer the most exact division which human art is able to give them: they are capable of being mixed with one another, as well as with metals of a baser, that is, of a less homogeneous nature, such as copper: by this mixture they spread themselves uniformly through the whole mass of the composed lump, so that every atom of it becomes proportionally possessed of a share of this noble mixture; by which means the sub-division of the precious metals is rendered very extensive.

Their physical qualities are invariable: they lose nothing by keeping; they are solid and durable; and though their parts are separated by friction, like every other thing, yet still they are of the number of those which suffer least by it.

If money, therefore, can be made of any thing, that is, if the proportional value of things vendible can be measured by any thing material, it may be measured by the metals.

II. The two metals being pitched upon as the most proper substances for realising the ideal scale of money, those who undertake the operation of adjusting a standard must constantly keep in their eye the nature and qualities of a scale, as well as the principles upon which it is formed.

The unit of the scale must constantly be the same, although realised in the metals, or the whole operation fails in the most essential part. This realising the unit is like adjusting a pair of compasses to a geometrical scale, where the smallest deviation from the exact opening once given must occasion an incorrect measure. The metals, therefore, are to money what a pair of compasses is to a geometrical scale.

This operation of adjusting the metals to the money of account implies an exact and determinate proportion of both metals to the money-unit, realised in all the species and denominations of coin, adjusted to that standard.

The smallest particle of either metal added to, or taken away from, any coins, which represent certain determinate parts of the scale, overturns the whole system of material money. And if, notwithstanding such variation, these coins continue to bear the same denominations as before, this will as effectually destroy their usefulness in measuring the value of things, as it would overturn the usefulness of a pair of compasses to suffer the opening to vary, after it is adjusted to the scale representing feet, toises, miles or leagues, by which the distances upon the plan are to be measured.

III. Debasing the standard is a good term; because it conveys a clear and distinct idea. It is diminishing the weight of the pure metal contained in that denomination by which a nation reckons, and which we have called the money-unit. Raising

the standard requires no farther definition, being the direct contrary.

IV. Altering the standard (that is, raising or debasing the value of the money-unit) is like altering the national measures or weights. This is best discovered by comparing the thing altered with things of the same nature which have suffered no alteration. Thus, if the foot of measure was altered at once over all England, by adding to it, or taking from it any proportional part of its standard length, the alteration would be best discovered by comparing the new foot with that of Paris, or of any other country, which had suffered no alteration. Just so, if the pound sterling, which is the English unit, shall be found any how changed, and if the variation it has met with be difficult to ascertain because of a complication of circumstances, the best way to discover it will be to compare the former and the present value of it with the money of other nations which has suffered no variation. This the course of exchange will perform with the greatest exactness.

V. Artists pretend, that the precious metals, when absolutely pure from any mixture, are not of sufficient hardness to constitute a solid and lasting coin. They are found also in the mines mixed with other metals of a baser nature; and the bringing them to a state of perfect purity occasions an unnecessary expence. To avoid, therefore, the inconvenience of employing them in all their purity, people have adopted the expedient of mixing them with a determinate proportion of other metals, which hurts neither their fusibility, malleability, beauty, or lustre. This metal is called alloy; and, being considered only as a support to the principal metal, is accounted of no value in itself. So that eleven ounces of gold, when mixed with one ounce of silver, acquires by that addition no augmentation of value whatever.

This being the case, we shall, as much as possible, overlook the existence of alloy, in speaking of money, in order to render language less subject to ambiguity.

2. *Incapacities of the metals to perform the office of an invariable measure of value.*

I. Were there but one species of such a substance as we have represented gold and silver to be; were there but one metal possessing the qualities of purity, divisibility, and durability; the inconveniences in the use of it for money would be fewer by far than they are found to be as matters stand.

Such a metal might then, by an unlimited division into parts exactly equal, be made to serve as a tolerably steady and universal measure. But the rivalship between the metals, and the perfect equality which is found between all their physical qualities, so far as regards purity and divisibility, render them so equally well adapted to serve as the common measure of value, that they are universally admitted to pass current as money.

What is the consequence of this? That the one measures the value of the other, as well as that of every other thing. Now the moment any measure begins to be measured by another, whose proportion to it is not physically, perpetually, and invariably the same, all the usefulness of such a measure is lost. An example will make this plain.

A foot of measure is a determinate length. An English foot may be compared with the Paris foot, or with that of the Rhine; that is to say, it may be measured by them: and the proportion between their lengths may be expressed in numbers; which proportion will be the same perpetually. The measuring the one by the other will occasion no uncertainty; and we may speak of length by Paris feet, and be perfectly well understood by others who are used to measure by the English foot, or by the foot of the Rhine.

But suppose that a youth of twelve years old takes it into his head to measure from time to time, as he advances in age, by the length of his own foot, and that he divides this growing foot into inches and decimals, what can be learned from his account of measures? As he increases in years, his foot, inches, and subdivisions, will be gradually lengthening; and were every man to follow his example, and measure by his own foot, then the foot of a measure now established would totally cease to be of any utility.

This is just the case with the two metals. There is no determinate invariable proportion between their value; and the consequence of this is, that when they are both taken for measuring the value of other things, the things to be measured, like lengths to be measured by the young man's foot, without changing their relative proportion between themselves, change, however, with respect to the denominations of both their measures. An example will make this plain.

Let us suppose an ox to be worth 3000 pounds weight of wheat, and the one and the other to be worth an ounce of gold, and an ounce of gold to be worth exactly 15 ounces of silver: if the case should happen, that the proportional value between gold and silver should come to be as 14 is to 1, would not the ox, and consequently the wheat, be estimated at less in silver, and more in gold, than formerly? Farther, would it be in the power of any state to prevent this variation in the measure of the value of oxen and wheat, without putting into the unit of their money less silver and more gold than formerly?

If therefore any particular state should fix the standard of the unit of their money to one species of the metals, while in fact both the one and the other are actually employed in measuring value; does not such a state resemble the young man who measures all by his growing foot? For if silver, for example, be retained as the standard, while it is gaining upon gold one fifteenth additional value; and if gold continue all the while to determine the value of things as well as silver; it is plain, that, to all intents and purposes, this silver-measure is lengthening daily like the young man's foot, since the same weight of it must become every day equivalent to more and more of the same commodity; notwithstanding that we suppose the same proportion to subsist, without the least variation, between that commodity and every other species of things alienable.

Buying and selling are purely conventional, and no man is obliged to give his merchandise at what may be supposed to be the proportion of its worth. The use, therefore, of an universal measure, is to mark, not only the relative value of the things to which it is applied as a measure, but to discover in an instant the proportion between the value of those, and of every other commodity valued by a determinate measure in all the countries of the world.

Were pounds sterling, livres, florins, piastres, &c. which are all money of account, invariable in their values, what a facility would it produce in all conversions, what an assistance to trade! But as they are all limited or fixed to coins, and consequently vary from time to time, this exam-

ple shows the utility of the invariable measure which we have described.

There is another circumstance which incapacitates the metals from performing the office of money: the substance of which the coin is made is a commodity which rises and sinks in its value with respect to other commodities, according to the wants, competition, and caprices of mankind. The advantage, therefore, found in putting an intrinsic value into that substance which performs the function of money of account, is compensated by the instability of that intrinsic value; and the advantage obtained by the stability of paper, or symbolical money, is compensated by the defect it commonly has of not being at all times susceptible of realization into solid property or intrinsic value.

In order, therefore, to render material money more perfect, this quality of metal, that is, of a commodity, should be taken from it; and in order to render paper-money more perfect, it ought to be made to circulate upon metallic or land security.

II. There are several smaller inconveniences accompanying the use of the metals, which we shall here shortly enumerate.

1mo, No money made of gold or silver can circulate long without losing its weight, although it all along preserves the same denomination. This represents the contracting a pair of compasses which had been rightly adjusted to the scale.

2do, Another inconvenience proceeds from the fabrication of money. Supposing the faith of princes who coin money to be inviolable, and the probity as well as the capacity of those to whom they commit the inspection of the business of the metals to be sufficient, it is hardly possible for workmen to render every piece exactly of a proper weight, or to preserve the due proportion between pieces of different denominations; that is to say, to make every ten sixpences exactly of the same weight with every crown-piece and every five shillings struck in a coinage. In proportion to such inaccuracies the parts of the scale become unequal.

3tio, Another inconvenience, and far from being inconsiderable, flows from the expence requisite for the coining of money. This expence adds to its value as a manufacture, without adding any thing to its weight.

4to, The last inconvenience is, that by fixing the money of account entirely to the coin, without having any independent common measure, (to mark and controul these deviations from mathematical exactness, which are either inseparable from the metals themselves, or from the fabrication of them,) the whole measure of value, and all the relative interests of debtors and creditors, become at the disposal not only of workmen in the mint, of Jews who deal in money, of clippers and washers of coin; but they are also entirely at the mercy of princes, who have frequently also the right of coinage, and who have frequently also the right of raising or debasing the standard of the coin, according as they find it most for their present and temporary interest.

3. *Methods which may be proposed for lessening the several inconveniences to which material money is liable.*

The inconveniences from the variation in the relative value of the metals to one another may in some measure be obviated by the following expedients.

1mo, By considering one only as the standard, and leaving the other to seek its own value like any other commodity.

2do, By considering one only as the standard, and fixing the value of the other from time to time by authority, according as the market-price of the metals shall vary.

3tio, By fixing the standard of the unit according to the mean proportion of the metals, attaching it to neither; regulating the coin accordingly; and upon every considerable variation in the proportion between them, either to make a new coinage, or to raise the denomination of one of the species, and lower it in the other, in order to preserve the unit exactly in the mean proportion between the gold and silver.

4to, To have two units and two standards, one of gold and one of silver, and to allow every body to stipulate in either.

5to, Or last of all, to oblige all debtors to pay one half in gold, and one half in the silver standard.

4. *Variations to which the value of the money-unit is exposed from every disorder in the coin.*

Let us suppose, at present, the only disorder to consist in a want of the due proportion between the gold and silver in the coin.

This proportion can only be established by the market price of the metals; because an augmentation and rise in the demand for gold or silver has the effect of augmenting the value of the metal demanded. Let us suppose, that to-day one pound of gold may buy fifteen pounds of silver: if to-morrow there be a high demand for silver, a competition among merchants to have silver for gold will ensue: they will contend who shall get the silver at the rate of 15 pounds for one of gold: this will raise the price of it; and in proportion to their views of profit, some will accept of less than the 15 pounds. This is plainly a rise in the silver, more properly than a fall in the gold; because it is the competition for the silver which has occasioned the variation in the former proportion between the metals.

Let us now suppose that a state, having with great exactness examined the proportion of the metals in the market, and having determined the precise quantity of each for realising or representing the money-unit, shall execute a most exact coinage of gold and silver coin. As long as that proportion continues unvaried in the market, no inconvenience can result from that quarter in making use of metals for money of account.

But let us suppose the proportion to change; that the silver, for example, shall rise in its value with regard to gold: will it not follow, from that moment, that the unit realized in the silver will become of more value than the unit realized in the gold coin?

But as the law has ordered them to pass as equivalents for one another, and as debtors have always the option of paying in what legal coin they think fit, will they not all choose to pay in gold? and will not then the silver coin be melted down or exported, in order to be sold as bullion, above the value it bears when it circulates in coin? Will not this paying in gold also really diminish the value of the money-unit? since upon this variation every thing must sell for more gold than before, as we have really observed.

Consequently, merchandise, which have not

varied in their relative value to any other thing but to gold and silver, must be measured by the mean proportion of the metals; and the application of any other measure to them is altering the standard. If they are measured by gold, the standard is debased; if by silver, it is raised.

If, to prevent the inconvenience of melting down the silver, the state shall give up affixing the value of their unit to both species at once, and shall fix it to one, leaving the other to seek its price as any other commodity; in that case, no doubt, the melting down of the coin will be prevented; but will this ever restore the value of the money-unit to its former standard? Would it, for example, in the foregoing supposition, raise the debased value of the money-unit in the gold coin, if that species were declared to be the standard? It would indeed render silver coin purely a merchandise, and, by allowing it to seek its value, would certainly prevent it from being melted down as before; because the pieces would rise conventionally in their denomination; or an agio, as it is called, would be taken in payments made in silver: but the gold would not, on that account, rise in its value, or begin to purchase any more merchandise than before. Were therefore the standard fixed to the gold, would not this be an arbitrary and a violent revolution in the value of the money-unit, and a debasement of the standard?

If, on the other hand, the state should fix the standard to the silver, which we suppose to have risen in its value, would that ever sink the advanced value which the silver coin had gained above the worth of the former standard unit? and would not this be a violent and an arbitrary revolution in the value of the money-unit, and a raising of the standard?

The only expedient, therefore, is, in such a case, to fix the numerary unit to neither of the metals, but to contrive a way to make it fluctuate in a mean proportion between them; which is in effect the introduction of a pure ideal money of account.

The regulation of fixing the unit by the mean proportion, ought to take place at the instant the standard unit is fixed with exactness both to the gold and silver. If it be introduced long after the market proportion between the metals has deviated from the proportion established in the coin; and if the new regulation is made to have a retrospect, with regard to the acquitting of permanent contracts entered into while the value of the money-unit had attached itself to the lowest currency in consequence of the principle above laid down; then the restoring the money-unit to that standard where it ought to have remained (to wit, to the mean proportion) is an injury to all debtors who have contracted since the time that the proportion of the metals began to vary.

This is clear from the former reasoning. The moment the market price of the metals differs from that in the coin, every one who has payments to make pays in that species which is the highest rated in the coin; consequently, he who lends, lends in that species. If after the contract, therefore, the unit is carried up to the mean proportion, this must be a loss to him who had borrowed.

From this we may perceive, why there is less inconvenience from the varying of the proportion of the metals, where the standard is fixed to one of them, than when it is fixed to both. In the first case, it is at least uncertain whether the standard or the merchandise species is to rise; consequently it is uncertain whether the debtors or the creditors are to gain by a variation. If the standard species should rise, the creditors will gain; if the merchandise species rises, the debtors will gain; but when the unit is attached to both species, then the creditors never can gain, let the metals vary as they will: if silver rises, then debtors will pay in gold; if gold rises, the debtors will pay in silver. But whether the unit be attached to one or to both species, the infallible consequence of a variation is, that one half of the difference is either gained or lost by debtors and creditors. The invariable unit is constantly the mean proportional between the two measures.

5. How the variations of the intrinsic value of the unit of money must affect all the domestic interest of a nation.

If the changing the content of the bushel by which grain is measured would affect the interest of those who are obliged to pay, or who are entitled to receive, a certain number of bushels of grain for the rent of lands; in the same manner must every variation in the value of the unit of account affect all persons who, in permanent contracts, are obliged to make payments, or who are obliged to received sums of money stipulated in multiples or in fractions of that money-unit.

Every variation, therefore, upon the intrinsic value of the money-unit has the effect of benefiting the class of creditors at the expence of debtors, or *vice versa*.

This consequence is deduced from an obvious principle. Money is more or less valuable in proportion as it can purchase more or less of every kind of merchandise. Now, without entering anew into the causes of the rise and fall of prices, it is agreed upon all hands, that whether an augmentation of the general mass of money in circulation has the effect of raising prices in general, or not, any augmentation of the quantity of the metals appointed to be put into the money-unit must at least affect the value of that money-unit, and make it purchase more of any commodity than before: that is to say, 113 grains of fine gold, the present weight of a pound sterling in gold, can buy 113 pounds of flour; were the pound sterling raised to 114 grains of the same metal, it would buy 114 pounds of flour: consequently, were the pound sterling augmented by one grain of gold, every miller who paid a rent of ten pounds a year would be obliged to sell 1140 pounds of his flour, in order to procure ten pounds to pay his rent, in place of 1130 pounds of flour, which he sold formerly to procure the same sum: consequently, by this innovation, the miller must lose yearly ten pounds of flour, which his master consequently must gain. From this example it is plain, that every augmentation of metals put into the pound sterling, either of silver or gold, must imply an advantage to the whole class of creditors who are paid in pounds sterling, and consequently must be a proportional loss to all debtors who must pay by the same denomination.

6. Regulations which the principle of this inquiry points out as expedient to be made by a new statute for regulating the British coin.

Let us now examine what regulations it may be proper to make by a new statute concerning the

coin of Great Britain, in order to preserve always the same exact value of the pound sterling realized in gold and in silver, in spite of all the incapacities inherent in the metals to perform the functions of an invariable scale or measure of value.

1. The first point is to determine the exact number of grains of fine gold and fine silver which are to compose it, according to the then proportion of the metals in the London market.

2. To determine the proportion of these metals with the pound troy; and in regard that the standard of gold and silver is different, let the mint price of both metals be regulated according to the pound troy fine.

3. To fix the mint price within certain limits; that is to say, to leave to the king and council, by proclamation, to carry the mint price of bullion up to the value of the coin, as is the present regulation, or to sink it to per cent. below that price, according as government shall incline to impose a duty upon coinage.

4. To order, that silver and gold coin shall be struck of such denominations as the king shall think fit to appoint; in which the proportion of the metals above determined shall be constantly observed through every denomination of the coin, until necessity shall make a new general coinage unavoidable.

5. To have the number of grains of the fine metal in every piece marked upon the exergue, or upon the legend of the coin, in place of some initial letters of titles, which not one person in a thousand can decypher; and to make the coin of as compact a form as possible, diminishing the surface of it as much as is consistent with beauty.

6. That it shall be lawful for all contracting parties to stipulate their payments either in gold or silver coin, or to leave the option of the species to one of the parties.

7. That where no particular stipulation is made, creditors shall have power to demand payment, half in one species, half in the other; and when the sum cannot fall equally into gold and silver coins, the fractions to be paid in silver.

8. That in buying and selling, when no particular species has been stipulated, and when no act in writing has intervened, the option of the species shall be competent to the buyer.

9. That all sums paid or received by the king's receivers, or by bankers, shall be delivered by weight, if demanded.

10. That all money which shall be found under the legal weight, from whatever cause it may proceed, may be rejected in every payment whatsoever: or if offered in payment of a debt above a certain sum, may be taken according to its weight, at the then mint price, in the option of the creditor.

11. That no penalty shall be incurred by those who melt down or export the nation's coin; but that washing, clipping, or diminishing the weight of any part of it shall be deemed felony, as much as any other theft, if the person so degrading the coin shall afterwards make it circulate for lawful money.

To prevent the inconveniences proceeding from the variation in the proportion between the metals, it may be provided,

12. That upon every variation of proportion in the market-price of the metals, the price of both shall be changed according to the following rule:

Let the price of the pound troy fine gold in the coin be called G.

Let the price of ditto in the silver be called S.

Let the new proportion between the market-price of the metal be called P.

Then state this formula:

$$\frac{G}{2P} + \frac{S}{2} = \text{to a pound troy fine silver in sterling currency.}$$

$$\frac{S}{2} + P + \frac{G}{2} = \text{to a pound troy fine gold in sterling currency.}$$

This will be a rule for the mint to keep the price of the metals constantly at par with the price of the market; and coinage may be imposed, as has been described, by fixing the mint price of them at a certain rate below the value of the fine metals in the coin.

13. As long as the variation of the market-price of the metals shall not carry the price of the rising metal so high as the advanced price of the coin above the bullion, no alteration need be made on the denomination of either species.

14. So soon as the variation of the market price of the metals shall give a value to the rising species, above the difference between the coin and the bullion; then the king shall alter the denominations of all the coin, silver and gold, adding to the coins of the rising metal exactly what is taken from those of the other. An example will make this plain:

Let us suppose that the coinage has been made according to the proportion of 14.5 to 1; that 20 shillings, or 4 crown-pieces, shall contain, in fine silver, 14.5 times as many grains as the guinea, or the gold pound, shall contain grains of fine gold. Let the new proportion of the metals be supposed to be 14 to 1. In that case, the 20 shillings, or the 4 crowns, will contain $\frac{1}{28}$ more value than the guinea. Now, since there is no question of making a new general coinage upon every variation, in order to adjust the proportion of the metals in the weight of the coins, that proportion might be adjusted by changing their respective denominations according to this formula:

Let the 20 shillings, or 4 crowns, in coin, be called S. Let the guinea be called G. Let the difference between the old proportion and the new, which is $\frac{1}{29}$, be called P. Then say, $S + \frac{P}{2} =$ a pound sterling, and $G + \frac{P}{2} =$ a pound sterling.

By this it appears that all the silver coin must be raised in its denomination $\frac{1}{58}$, and all the gold coin must be lowered in its denomination $\frac{1}{58}$; yet still $S + G$ will be equal to two pounds sterling, as before, whether they be considered according to the old or according to the new denominations.

But it may be observed, that the imposition of coinage rendering the value of the coin greater than the value of the bullion, that circumstance gives a certain latitude in fixing the new denominations of the coin, so as to avoid minute fractions. For, providing the deviation from the exact proportion shall fall within the advanced price of the corn, no advantage can be taken by melting down one species preferably to another; since, in either case, the loss incurred by melting the coin must be greater than the profit made upon selling the bullion. The mint price of the metals, however, may be fixed exactly, that is, within the value of a farthing upon a pound of fine silver or gold. This is easily reckoned at the

mint; although upon every piece in common circulation the fractions of farthings would be inconvenient.

15. That notwithstanding the temporary variations made upon the denomination of the gold and silver coins, all contracts formerly entered into, and all stipulations in pounds, shillings, and pence, may continue to be acquitted according to the old denominations of the coins, paying one-half in gold and one-half in silver: unless in the case where a particular species has been stipulated; in which case the sum must be paid according to the new regulation made upon the denomination of that species, to the end that neither profit nor loss may result to any of the parties.

16. That notwithstanding the alterations on the mint price of the metals, and in the denomination of the coins, no change shall be made upon the weight of the particular pieces of the latter, except in the case of a general re-coinage of one denomination at least: that is to say, the mint must not coin new guineas, crowns, &c. of a different weight from those already in currency, although by so doing the fractions might be avoided. This would occasion confusion, and the remedy would cease to be of any use upon a new change in the proportion of the metals. But it may be found convenient for removing the small fractions in shillings and sixpences, to recoin such denominations altogether, and to put them to their integer numbers, of twelve and of sixpence, without changing in any respect their proportion of value to all other denominations of the coin: this will be no great expence, when the bulk of the silver coin is put into 5 shilling pieces.

By this method of changing the denominations of the coin, there never can result any alteration in the value of the pound sterling; and although fractions of value may now and then be introduced, in order to prevent the abuses to which the coin would otherwise be exposed by the artifice of those who melt it down, yet still the inconvenience of such fractions may be avoided in paying, according to the old denominations, in both species, by equal parts. This will also prove that no change is thereby made in the true value of the national unit of money.

17. That it be ordered, that shillings and sixpences shall only be current for twenty years; and all other coins, both gold and silver, for forty years or more. For ascertaining which term there may be marked upon the exergue of the coin the last year of their currency, in place of the date of their fabrication. This term elapsed, or the date effaced, that they shall have no more currency whatsoever; and, when offered in payment, may be received as bullion at the actual price of the mint, or refused, at the option of the creditor.

18. That no foreign coin shall have any legal currency, except as bullion at the mint price.

By these and the like regulations may be prevented, 1mo, The melting or exporting of the coin in general. 2do, The melting or exporting one species, in order to sell it as bullion at an advanced price. 3tio, The profit in acquitting obligations preferably in one species to another. 4to, The degradation of the standard, by the wearing of the coin, or by a change in the proportion between the metals. 5to, The circulation of the coin below the legal weight. 6to, The profit that other nations reap by paying their debts more cheaply to Great Britain than Great Britain can pay hers to them.

And the great advantage of it is, that it is an uniform plan, and may serve as a perpetual regulation, compatible with all kinds of denominations of coins, variations in the proportion of the metals, and with the imposition of a duty upon coinage, or with the preserving it free; and further, that it may in time be adopted by other nations, who will find the advantage of having their money of account preserved perpetually at the same value, with respect to the denominations of all foreign money of account established on the same principles.

A TABLE, exhibiting the standard weight, value, and a comparative view of English Gold Money from King William I. Ann. 1066, to King George III. Ann. 1764.

Years of the kings and queens reigns, or the dates of the several mint indentures.		Standard of the gold at each period.		Value or No of pounds, &c. the lb. Troy of stand. gold has been coined into.	Value or number of pounds, &c. the oz. Troy has been coined into.	Value or 20 shillings of coined gold at each period in our present money.	Proportion of the same 20 shillings to our present 20 shillings.	Proportion between the current value of the lb. Troy of standard silver and standard gold.	Proportion of fine silver to fine gold at each period.
		Fine gold.	Alloy.						
Anni Regnorum.	A.D.	oz.dw.gr.	oz.dw.gr.	l. s. d.	l. s. d.	l. s. d.			
William I. - -	1066	11 18 18	0 1 6						
William II. - - -	1087	11 18 18	0 1 6	9 0 0	0 15 0	5 12 $8\frac{1}{8}$	5.63414	9.0000	8.36874
18th Edw. III. / VI.	1345	11 18 18	0 1 6	15 0 0	1 5 $1\frac{5}{8}$	3 7 $7\frac{1}{4}$	3.38048	14.8148	13.7754
18th same - - -	1345	11 18 18	0 1 6	13 3 4	1 2 $0\frac{5}{8}$	3 17 $0\frac{1}{4}$	3.85118	13.0041	12.0917
20th same - - -	1347	11 18 18	0 1 6	14 0 0	1 3 5	3 12 $5\frac{1}{4}$	3.69194	12.4444	11.5714
27, 30, 37, and 46th do. - / 18th Richard II. - - / and 3d Henry IV. - -	1373 / 1395 / 1402	11 18 18	0 1 6	15 0 0	1 5 $1\frac{1}{8}$	3 7 $7\frac{1}{4}$	3.38048	12.0000	11.1581
9th Henry V. - - -	1422	11 18 18	0 1 6	16 13 4	1 7 $11\frac{1}{4}$	3 0 $10\frac{1}{8}$	3.04243	11.1111	10.3315
1st and 39th Henry VI.	1422 / 1461	11 18 18	0 1 6	22 10 0	1 17 $6\frac{3}{8}$	2 5 $0\frac{1}{8}$	2.25365	12.0000	11.1581
4th same - - -	1426	11 18 18	0 1 6	16 13 4	1 7 $11\frac{1}{8}$	3 0 $10\frac{1}{8}$	3.04243	11.1111	10.3315
4th Edw. IV. / VII. -	1465	11 18 18	0 1 6	20 16 8	1 14 $10\frac{1}{8}$	2 8 $8\frac{1}{8}$	2.43394	11.1111	10.3316
5, 6, 11, 16, and 22d ditto / 1st Richard III. - - / and 9th Henry VII. -	1482 / 1483 / 1494	11 18 18	0 1 6	22 10 0	1 17 $8\frac{3}{8}$	2 5 $0\frac{7}{8}$	2.25365	12.0000	11.1551
1st and 23d Henry VIII.	1509 / 1532	11 18 18	0 1 6	27 0 0	2 5 $2\frac{3}{8}$	1 17 $6\frac{3}{4}$	1.87804	12.0000	11.1581
1st and 23d same	1509 / 1532	11 0 0	1 0 0	25 2 6	2 5 $8\frac{1}{4}$	1 17 $2\frac{1}{4}$	1.85971	11.1666	11.2682

34th same	1543	11 10 0	0 10 0	23 16 0	2 10 1	1 13 $11\frac{1}{8}$	1.69614	12.0000	10.4348
36th same	1545	11 0 0	1 0 0	30 0 0	2 14 $6\frac{1}{2}$	1 11 1	1.55750	12.5000	6.81818
37th same 1st and 2d VI. Edw. IX.	1546 1549	10 0 0	2 0 0	30 0 0	3 0 0	1 8 $3\frac{7}{8}$	1.41591	12.5000	5.0000
3d same	1550	11 0 0	1 0 0	34 0 0	3 1 $9\frac{3}{4}$	1 7 $5\frac{7}{8}$	1.37426	9.4444	5.15151
4th same	1551	11 18 18	0 1 6	28 16 0	2 8 3	1 15 $2\frac{1}{2}$	1.76066	8.0000	2.01048
6th same	1553	11 18 18	0 1 6	36 0 0	3 0 $5\frac{1}{4}$	1 8 2	1.40[illegible]3	12.0000	11.1078
6th same	1553	11 0 0	1 0 0	33 0 0	3 0 0	1 8 $3\frac{1}{8}$	[illegible]	11.0000	11.050[illegible]
1st Mary I. 2d Elizabeth	1553 1560	11 18 18	0 1 6	36 0 0	3 0 0	1 8 2	1.40853	12.0000	11.0576
2d and 35th same	1560 1594	11 0 0	1 0 0	33 0 0	3 0 0	1 8 3	1.41591	11.0000	11.1000
19th and 26th ditto	1578 1585	11 18 18	0 1 6	36 0 0	3 0 $3\frac{1}{4}$	1 8 2	1.40853	12.0000	11.1581
43d same	1601	11 18 18	0 1 6	36 10 0	3 1 $1\frac{3}{4}$	1 7 $9\frac{7}{8}$	1.38924	11.7741	10.9481
43d same	1601	11 0 0	1 0 0	33 10 0	3 0 $10\frac{3}{4}$	1 7 $10\frac{1}{4}$	1.39177	10.8064	10.9047
1st James I.	1603	11 0 0	1 0 0	37 10 0	3 8 $2\frac{3}{8}$	1 4 11	1.24600	12.0967	12.2067
2d same	1604	11 0 0	1 0 0	37 4 0	3 7 $7\frac{3}{8}$	1 5 $1\frac{1}{8}$	1.25604	12.0000	12.1091
3d same	1605	11 18 18	0 1 6	40 10 0	3 7 $10\frac{3}{4}$	1 5 $0\frac{1}{2}$	1.25203	13.0545	12.1479
10th same	1613	11 18 18	0 1 6	44 0 0	3 13 8	1 3 $0\frac{5}{8}$	1.15240	14.1935	13.1977
10th same	1613	11 0 0	1 0 0	40 18 4	3 14 4	1 2 10	1.14195	13.1935	13.3189
2d Charles I. 12th Charles II.	1627 1661	11 18 18	0 1 6	44 10 0	3 14 $6\frac{3}{8}$	1 2 $9\frac{1}{2}$	1.13948	14.3548	13.3478
2d Charles I.	1627	11 0 0	1 0 0	41 0 0	3 14 $6\frac{1}{7}$	1 2 $9\frac{1}{2}$	1.13948	13.2258	13.3[illegible]60
22d Charles II. 1st James II.	1671 1685	11 0 0	1 0 0	44 10 0	4 0 10	1 1 0	1.05000	14.3548	14.48[illegible]
William III.		11 0 0	1 0 0	47 15 9	4 6 $11\frac{1}{4}$	0 19 $6\frac{3}{8}$	.976743	15.4314	15.5717
3d George I. 3d George III.	1717 1763	11 0 0	1 0 0	46 14 6	4 4 $11\frac{1}{2}$	1 0 0	1.00000	15.07258	15.2[illegible]60

A TABLE, shewing the standard weight, value, and comparative view of English Silver Money, from King William the First, A. D. 1066, to A. D. 1765.

Dates of the several mint indentures.	Standard of the silver at each period. Fine Silver.	Standard of the silver at each period. Alloy.	Number of shillings, &c. in the pound weight, viz. in twelve ounces Troy, of standard silver coined at each period.	Weight of twenty shillings in reckoning of standard silver at each period.	Weight of fine silver contained in twenty shillings at each period.	Value of the same twenty shillings in reckoning of ou present money.	Proportion of money at each period to that of our present money.	Value of the ounce of the then standard silver to that of our present money.	Value of the ounce fine silver at each period.	Kings and Queens in these Periods.
A. D.	oz. dw.	oz. dw.	sh. d.	oz dw. gr.	oz. dw. gr.	l. s. d.	———	sh. d.	sh. d.	
1066	11 2	0 18	21 4	11 5 0	10 8 3	2 18 1½	2.9062	5 2	1 11⅛	William Conq.
1087	11 2	0 18	20 0	12 0 0	11 2 0	3 2 0	3.1000	5 2	1 9⅝	William Rufus.
1300	11 2	0 18	20 3	11 17 1	10 19 6	3 1 2¼	3.0614	5 2	1 9⅞	Edward I.
1347	11 2	0 18	22 6	10 13 8	9 17 8	2 15 1⅜	2.7557	5 2	2 0⅜	Edward III.
1354 } 1395 } 1402 }	11 2	0 18	25 0	9 12 0	8 17 11½	2 9 7¼	2.4802	5 2	2 3	Richard II. Henry IV.
1412	11 2	0 18	32 0	7 10 0	6 18 18	1 18 9	1.9375	5 2	2 10⅝	
1422	11 2	0 18	30 0	8 0 0	7 8 0	2 1 4	2.0666	5 2	2 8½	Henry VI.
1423	11 2	0 18	37 6	6 8 0	5 18 10	1 13 0¾	1.6531	5 2	3 4½	
1426 } 1446 }	11 2	0 18	30 0	8 0 0	7 8 0	2 1 4	2.0666	5 2	2 8¼	

MONEY.

1461										
1464										
1482	11 2	0 18	37 6	6 8 0	5 13 10	1 13 $0\frac{3}{4}$	1.6531	5 2	3 $4\frac{1}{2}$	Edward IV.
1483										
1494										Edward V.
1505	11 2	0 18	40 0	6 0 0	5 11 0	1 11 0	1.5500	5 2	3 $7\frac{1}{4}$	Henry VII.
1509										
1532	11 2	0 18	45 0	5 6 16	4 18 6	1 7 $6\frac{5}{8}$	1.3776	5 2	4 $0\frac{5}{8}$	Henry VIII.
1543	10 0	2 0	48 0	5 0 0	4 3 8	1 3 $3\frac{1}{4}$	1.1635	4 $7\frac{7}{8}$	4 $9\frac{5}{8}$	
1545	6 0	6 0	48 0	5 0 0	2 10 0	0 13 $11\frac{5}{8}$	0.6984	2 $9\frac{1}{2}$	8 0	
1546										
1547	4 0	8 0	48 0	5 0 0	1 13 8	0 9 $3\frac{3}{4}$	0.4656	1 $10\frac{3}{8}$	12 0	
1548										
1549	6 0	6 0	72 0	3 6 16	1 13 8	0 9 $3\frac{3}{4}$	0.4656	2 $9\frac{1}{2}$	12 0	Edward VI.
1551	3 0	9 0	72 0	3 6 16	0 16 16	0 4 $7\frac{7}{8}$	0.2328	1 $4\frac{3}{4}$	24 0	
1553	11 1	0 19	60 0	4 0 0	3 13 16	1 0 $6\frac{7}{8}$	1.0286	5 $1\frac{1}{4}$	5 $5\frac{1}{8}$	Mary I.
1560										
1583	11 2	0 18	60 0	4 0 0	3 14 0	1 0 8	1.0333	5 2	5 $4\frac{7}{8}$	Elizabeth.
1601										
1605										
1627										James I.
1661										Charles I.
1671	11 2	0 18	62 0	3 17 10	3 11 $14\frac{3}{4}$	1 0 0	1.0000	5 2	5 7	Charles II.
1685										James II.
1720										George I.
1764										George III.

Before we terminate this article, we add the following brief account of the coins, or current moneys. of different countries.

In Ireland the coins are as in England. viz. guineas, shillings, &c. with this difference, that the English shilling passes for twenty-six halfpence, which are the only coin peculiar to that country.

Coins of the French Empire.

The current coins of France were formerly the double louis (gold), the louis (gold), the piece of six livres (silver), that of three livres, the ecu (silver), twenty four sols piece (silver), the twelve (silver), the six sols piece (silver), the large or double sol (of copper), the sol (of copper), and the half and quarter sol, or pieces of two and one liard There are also ancient pieces made of copper and silver, denominated pieces of six liards, value one sol and a half.

According to the new system, an attempt has been made, with partial success, to introduce the following currency. The denomination of livre has been changed into that of franc, with an alteration, in the small proportion of only threepence to the louis. The franc is then assumed as the basis or unit of all their computations; and all values are reckoned upwards by tens, hundreds, and thousands of francs, and downwards by tenth parts and hundredth parts of francs.

Some coins have been put into circulation agreeably to this new system, viz. in silver pieces of 5 francs, in pieces of 20 sols, being a fourth of the franc, and in pieces of 15 sols, being the eighth of the franc; in copper pieces of 5 centimes (five hundredths) equal to the old sol, and of 10 centimes (ten hundredths) or 1 decime, equal to the double sol.

Value of the coinage of both nation.—As a primary principle, the traveller must recollect, that whenever the course of exchange between the two countries is at par, the French louis is to be considered as of equal value to the English pound sterling.

Existing English coins.		*French value.*
The guinea	is equal to	One louis and one 24 sols piece.
The crown piece	—	The six livre piece.
The half-crown	—	The three livre piece.
The shilling	—	The 24 sols piece.
The sixpence	—	The 12 sols piece.
The penny	—	The double sol.
The halfpenny	—	The sol.
The farthing	—	The deux liards.

Existing French coins.		*English value.*
The louis, containing 24 livres or francs		One pound sterling.
The six livre piece	—	Five shillings.
The five franc piece	—	Four shillings and twopence.
The livre piece	—	Half-crown.
The 30 sol piece	—	Fifteen pence.
The 24 sol piece	—	One shilling.
The 15 sol piece	—	Seven pence halfpenny.
The 12 sol piece	—	Six pence.
The 6 sol piece	—	Three pence.
The double piece	—	A penny.
The 6 liard piece	—	Three farthings.
The sol	—	One halfpenny.
The 2 liard piece	—	One farthing.
The liard	—	Half a farthing.

The livre or franc is a nominal value, equal to ten-pence English. The tenth part of a franc is called a decime, and the hundredth part of a franc is called a centime.

Spanish coins.—In Spain, and the states depending upon it, the gold coin is the pistole; above which are the double pistole and piece of four pistoles, and under it the half-pistole; to which must be added the castillans of gold. The silver money is the piastre, or piece of eight rials, and its diminutions; as also the simple rial, with its diminutions. The copper coins are the ochavos, or octavos, which are of two kinds; the one equal to only four maravedis, and ordinarily called quarta; the other double this, and called double quarta: and lastly the maravedis. It must be observed, that in Spain they have new money and old; the old current in Sevil, Cadiz, Andalusia, &c. is worth 25 per cent. more than the new current at Madrid, Bilboa, St. Sebastian, &c This difference is owing to their king Charles II. who, to prevent the exportation of money, raised it 25 per cent, which however he was able to effect only in part, several provinces still retaining the ancient rate.

Value and proportion of the Spanish coin.

Quarto, 4 maravedis			
Octave, or double quarta, 8 maravedis			
Rial, old plata, equal to	0	0	6[illegible]
Piece of eight, or piastre	0	4	6
Pistole	0	16	9.[illegible]

Portuguese coins.—Those of gold are the moeda d'oro, or as we call it, moidore, which is properly their pistole; above this are doppio moedas or double pistoles, and quadruple species equal to five pistoles. The silver coins are the cruzada, pataca, or piece of eight, and vintem, of which they have two sorts, the one silver and the other bilon. The ree is of copper, which serves them in accompts as the maravedis do the Spaniards.

Res, ree, or rez, equal to three-fifths of a farthing sterling

Vintem. 20 res

Cruzada, 26 vintems.

	l.	*s.*	*d*
Mi-moeda, or half-pistole	0	13	6
Moeda d'oro, or pistole	1	7	0
Doppio moeda, or double pistole	2	14	0
Ducat of fine gold	0	15	0

Besides the above, they have also pieces of gold of the value of 3*l.* 12*s.*, 1*l.* 16*s.*, and other subdivisions.

Dutch coins.—Those of silver are crowns or dollars, ducatoons, florins, and schellings, each of which has its diminution. The stiver is of billon: the duyt and penny, of copper.

	l.	*s.*	*d.*
Ducat of Holland	0	9	3.2
Ducatoon	0	5	5.59
Patagon, or rix dollar	0	4	4.28
The three-guilder piece, or sixty stivers	0	5	2.46
The guilder-florin, or twenty stivers	0	1	8.08
The lion dollar	0	3	7.07

The schelling goes for six stivers, and the ortke is the fourth part of a stiver.

Flemish coins.—Those of gold are imperials, rides, or philips, alberts, and crowns; those of silver are philips, rix dollars, patagons, schellings, and guldens; and those of copper, patards.

	l.	*s.*	*d.*
Groat, 8 patards			
Single stiver	0	0	$1\frac{1}{2}$

MONEY.

	l.	s.	d.
Schelling	0	0	7¼
Gulden	0	2	0
Rix dollar, dollar, patagon	0	4	6
Imperial	0	11	9

The German, Dutch, and French coins are current here.

German coins.—Those of gold are ducats, which are of various kinds, oboli of the Rhine, and florins: of this last kind there are some likewise of silver, besides rix dollars, and izelottes, which are all of that metal.

	s.	d.
Ducat of the bishop of Bamberg	9	3.2
Ducat of Hanover	9	2.7
Ducat of Brandenburg	9	3.2
Ducatoon of Cologn	5	5.02
Rix dollar or patagon of Cologn	4	4.53
Rix dollar or patagon of Liege	4	7.48
Rix dollar of Mentz	4	7.27
Rix dollar of Frankfort	4	6.53
Rix dollar of the Palatinate of Nuremberg	4	7.55
Rix dollar of Lunenburg	4	6.65
Old rix dollar of Hanover	3	6.03
Old bank dollar of Hamburg	4	6.92
Rix dollar of Lubeck	4	7.54
Gulden of Hanover	2	4.14
Gulden of Zell	2	3.07
Gulden of Brandenburg	2	3.81
Gulden of Saxony	2	4.12

Italian coins.—The several states of Italy have several current moneys, though there are some common to all, such as the pistole of gold, and the ducatoon and florin of silver, which are of various weights, fineness, &c. The coins peculiar to Rome are the julios of silver, the pignatelle of billon, and the bavoco, demi-bayoco, and quadrine of copper. Venice has its sequins of gold; its justins, or ducatoons, and derlingues, of silver: Naples its carlins: Genoa, its croisats: Savoy and Piedmont, lys, or silver: this last state has its papyroles and cavales of billon.

Gold coins of Italy.

	s.	d.
The sequin of Venice	9	5.7
The old Italian pistole	16	7.6
Pistole of Rome, Milan, Venice, Florence, Savoy, Genoa	16	6.7
Double ducat of Genoa, Venice, and Florence	18	7.7
Single ducat of the same places	9	3.8

Silver coins.

The old ducat of Venice	3	4.50
The ducat of Naples	3	4.43
The ducat of Florence or Leghorn	5	4.62
The tarin, or fifth part of the ducat of Naples	0	8.09
The carlin, or tenth part	0	4.04
The escudi, or crown, of Rome, or piece of ten julios, or one hundred bayocos	5	1
The teston of Rome, or piece of three julios	1	6.32
The julio of Rome	0	6.10
The croisat of Genoa	6	6.74
Justine of Venice	4	9
Derelingue, one-fourth of the justine	1	2

Swiss coins.—Are ratzes and blazes of billon: the ratz equal to ¾ of a penny sterling: and the blaze of Berne, nearly equal to the ratz.

The German, French, and Italian coins, are current here.

Polish coins.

	s.	d.
The golden ducat	9	2.1
The old silver dollar of Dantzic	4	6.27
The old rix dollar of Thorn	4	5.85
The rix dollar of Sigismund III. and Uladislaus IV. kings of Poland	4	6.4
Abra	1	0½
Roup	0	4¾
Groch	0	0⅚

Danish coins.

	s.	d.
The gold ducat	9	5.2
The horse	1	1½
The four mark-piece	2	8.23
Marc lubs	1	6
Schesdal, or two marks	3	0
Rix mark	0	11
Slet mark	0	9

Swedish coins.—Those of copper are the roustique, alluvre, mark, and money.

	s.	d.
A gold ducat is equal to	9	3.2
An eight-mark piece of silver	7	2
A four-mark piece	2	7
A christine	1	1½
Caroline	1	5¼

The Swedish money properly so called is a kind of copper, cut into little square pieces, or plates, about the thickness of three English crowns, and stamped at the four corners with the Swedish arms; and current in Sweden for a rix dollar, or piece of eight.

Muscovite coins.—The proper coins of Muscovy are,

	s.	d.
The copec of gold, worth	1	6$\frac{1}{11}$
Copec of silver, or denaing	0	1
Polusk	0	0½
Motofske	0	0¼
The ruble of silver, valued at	4	6
The cheroonitz of gold, called ducat by foreigners	9	6

Turkish coins.—The gold coins are zingerlees, worth two dollars two-thirds; and tomilees, worth two dollars and a half, reckoning each dollar at 108 aspers; the sultani, xeriff, and chequeens, each worth about 9*s.* 4*d.*, 5*d.*, or 6*d.*, sterling.

The silver ones are the asper, worth a trifle more than a farthing sterling; and the para, or medin, worth three aspers.

Coins of the coast of Barbary.—Though the general currency in these parts is Spanish dollars, French crowns, Hungarian ducats, and the Turkish golden sultanins, there are some coins struck by the kings or deys in their different territories.

At Morocco, the metacals are a sort of gold ducats made by the Jews at their pleasure, so that their standard is very uncertain.

There are also the blanquille of silver, worth 2¼*d.*; and the filours of copper, eight of which go to a blanquille.

At Algiers, the gold coins are sultanins and aspers; and burbas, of which six go to an asper. The dubla is silver, and worth about 4*s.* 6*d.* The rubic, median, and zian, are of gold, the first equal to 35 aspers, or 1*s.* 9*d.* and the last 100 aspers.

At Tunis, they have sultanins of gold, but heavier by one-third than those of Constantinople: the nasura of silver, cut nearly square: and du-

blas and burbas, of the same value with those of Algiers.

Persian coins.—Are either of silver or copper: of the first kind are the

	s.	d.
Abassi, equal to	1	4½
Mamoudi	0	8¼
Shakee	0	4⅛

The copper coins are the casbequi, or cabsequi, equal to 5-12ths of a penny sterling. The telac, or cherasis, is of gold, but it has no currency among the merchants, being only a medal struck by every king of Persia upon his accession to the crown.

Chinese coins.—Throughout the kingdom of China and Tonquin there are not properly any coins struck; instead of these they cut their gold and silver into little pieces, of different weights: those of gold are called goltschuts; those of silver the natives call leam, the Portuguese taels. Beside these they have a small money of lead mixed with the scum of copper, having holes in the middle to string them on for the ease of numbering; this species is called caxa, cas, and pitis; and the string, which usually holds 200, is called santa. There are two sorts of goltschuts, the one of 32 and 1-7th ounces, and the other but half as much. The tael, or leam, is equal to 6*s*. 8*d*. sterling. The caxa, cas, or pites, is one-third of a farthing; 300,000 of them are only worth about 56 guilders and 5 stivers of Holland.

Coins of Japan.—The Japanese strike coupants both of gold and silver; and copper pieces with holes in the middle, like those of China, six hundred of which make the tael. The other moneys, which they cut, like the Chinese, of different weights, are chiefly three: the largest of the weight of six reals, viz. 48 taels, the tael equivalent to 75 Dutch stivers; the second equal to six and a half, and the third to 1 and 1-16th.

Coupant of gold weighs one ounce six drachms; its figure is a long oval, the longest diameter about four inches, and the shortest half an inch: worth 6*l*. 12*s*. 6*d*.

Other coupants of gold, near one-third of the former, amounting to about 2*l*. 4*s*. 2*d*. Coupant of silver current at 4*s*. 6*d*.

Copper money seven-twelfths of a farthing.

Coins of Siam.—In the dominions of Siam are struck gold pieces five or six grains heavier than the half pistole of Spain: but these are rather pieces of curiosity than of use in commerce. Their silver coin is the tical or baat: the diminutions of which are the mayon or seling, ¼ of the tical; the fouang, ½ of the mayon; the page, ¼ of the fouang; and clam ½ of the page; there are also sompays, in value ½ a fouang. The tical weighs 3 gross and 23 grains, which, reckoning the ounce of silver at 3½ louis tournois, is 32 sols and 4 deniers of that money, as it weighs near half an ounce.

Coins of the coasts and islands of the Indies.—The principal, and those most generally current, are pagodos, rupees, larins, fanos or fanoms, and coupans, each of which are struck both of gold and silver. Besides these, there are also particular coins: as at Goa, St. Thomases of gold; at Surat, Agra, and the rest of Indostan, the pecha, or pessa, and doudus, all of copper; the basarucos and chedas, of tin. The gold pagodo is common on all the coasts of Coromandel, and almost the only one in use in the trade carried on there. The English make them at Fort St. George, and the Dutch at Negapatam, of the same standard and weight with those of the country. The value is 5*s*. The value of the silver pagodo is very different: the smallest are worth eight tangas, reckoning the tanga at 90 or 100 basarucos, 8*s*.

The gold rupee is worth 1*l*. 11*s*. 6*d*.

Silver rupee varies in fineness and value. There are three kinds current, viz. rupee sicca, worth at Bengal, 2*s*. 11*d*.

Rupee of Madras, 2*s*. 5¼*d*.

Rupee of Surat, 2*s*. 3*d*.

This is to be understood of the new rupees; for as to the old ones of each kind, their value is less; those of Madras are but equal to 1*s*. 11*d*. those of Surat 2*s*. and the siccas 2*s*. 4*d*.

Larin, in form of a cylinder, bent in two, and flatted at each end, worth 9*d*.

Fanoms of gold are of different fineness, weight, and value. The heaviest are not worth above 5*d*. or 5½*d*. and the lightest little more than five farthings.

The silver fanoms are not worth at most above 2*d*.

St. Thomas, equal to 9*s*.

Pecha or pessa of copper, worth about ½*d*.

Doudou, somewhat less than ½*d*.

Basaruco, 1-5th of a farthing.

Cheda of pewter is of two kinds: the one octagonal, current at 1½*d*.

The other round, at ¾*d*.

In the dominions of the Great Mogul are rupees, mamoudas, and pechas; the first, both of gold and silver; the second of silver alone; and the third of copper. There are others struck by the princes tributary to him, particularly a silver piece of the king of Matoucha, worth ½*d*. a silver piece of the king of Ogden, worth 6*d*. a gold piece of the king of Achem, worth 1*l*. 3*s*. a gold piece of the king of Macasser, taken for a guilder.

Shells current for coin are, 1. Cowries, brought from the Maldives, and pass for $\frac{1}{16}$ of a penny sterling. The natives of the coast of Africa call them bouges. 2. Porcelaine, in America, a shell nearly on the same footing with the cowrie. 3. Zimbi, current particularly in the kingdoms of Angola and Congo.

Fruits current for coin are, 1. Cacao, among the Americans, fifteen of which are esteemed equivalent to a Spanish rial. 2. Maize, which has ceased to be current since the discovery of America by the Europeans. 3. Almonds, used in the East Indies, where cowries are not current. The value of these is higher or lower, according as the year is more or less favourable to this fruit; in a common year, an almond is worth about 1-20th part of a farthing.

For more on the subject of this article we would refer to Dr. Kelly's elaborate work, The Universal Cambist, just published.

MONEY (Paper). See BANK.

MO'NEYBAG. *s.* (*money* and *bag*.) A large purse (*Shakspeare*).

MO'NEYBOX. *s.* (*money* and *box*.) A till; repository of ready coin.

MO'NEYCHANGER. *s.* (*money* and *change*.) A broker of money (*Arbuthnot*).

MO'NEYED. *a.* (from *money*.) Rich in money: often used in opposition to those who are possessed of lands (*Locke*).

MO'NEYER. *s.* (from *money*.) 1. One

that deals in money; a banker. 2. A coiner of money.

MO'NEYLESS. *a.* (from *money.*) Wanting money; penniless (*Swift*).

MO'NEYMATTER. *s.* (*money* and *matter.*) Account of debtor and creditor (*Arbuthnot*).

MO'NEYSCRIVENER. *s.* (*money* and *scrivener.*) One who raises money for others (*Arbuthnot*).

MO'NEYSWORTH. *s.* (*money* and *worth.*) Something valuable (*L'Estrange*).

MO'NGCORN. *s.* (manȝ, Saxon, and *corn.*) Mixed corn: as, wheat and rye.

MO'NGER. *s.* (manȝeꞃe, Saxon, a trader.) A dealer; a seller (*Hudibras*).

MONGOZ, in mastiology. See LEMUR.

MO'NGREL. *a.* (from manȝ, Saxon, or *mengen*, to mix, Dutch.) Of a mixed breed.

MONILIA, in botany, a genus of the class cryptogamia, order fungi, consisting of moniliform filaments clustered into a head. Six species; of which four are stipitate, and two sessile: most of them indigenous to our own country.

MONILIFORM, in natural history, beaded like a necklace.

MONIMA, a beautiful woman of Miletus, whom Mithridates the Great married. When his affairs grew desperate, Mithridates ordered his wives to destroy themselves. Monima attempted to strangle herself, but when her efforts were unavailing, she ordered one of her attendants to stab her.

MO'NIMENT. *s.* (from *moneo*, Latin.) It seems to signify inscription in *Spenser*.

To MO'NISH. *v. a.* (*moneo*, Latin.) To admonish (*Ascham*).

MO'NISHER. *s.* (from *monish.*) An admonisher; a monitor.

MONI'TION. *s.* (*monitio*, Latin.) 1. Information; hint (*Holder*). 2. Instruction; document (*L'Estrange*).

MO'NITOR. *s.* (Latin.) One who warns of faults, or informs of duty. It is used of an upper scholar in a school commissioned by the master to look to the boys (*Locke*).

MO'NITORY. *a.* (*monitorius*, Lat.) Conveying useful instruction; giving admonition.

MO'NITORY. *s.* Admonition; warning (*Bacon*).

MONK anciently denoted a person who retired from the world to give himself up wholly to God, and to live in solitude and abstinence. The word is derived from the Latin *monachus*, and that from the Greek μοναχος, solitary; of μονος, *solus*, alone.

The original of monks seems to have been this: the persecutions which attended the first ages of the gospel forced some christians to retire from the world, and live in deserts and places most private and unfrequented, in hopes of finding that peace and comfort among beasts which were denied them among men. And this being the case of some very extraordinary persons, their example gave so much reputation to retirement, that the practice was continued when the reason of its commencement ceased. After the empire became christian, instances of this kind were numerous; and those whose security had obliged them to live separately and apart, became afterwards united into societies. We may also add, that the mystic theology, which gained ground towards the close of the third century, contributed to produce the same effect, and to drive men into solitude for the purposes of enthusiastic devotion.

The monks, at least the ancient ones, were distinguished into solitaries, cœnobites, and sarabaites. The solitary are those who live alone in places remote from all towns and habitations of men, as do still some of the hermits.—The cœnobites are those who live in community with several others in the same house, and under the same superiors.—The sarabaites were strolling monks, having no fixed rule or residence.

The houses of monks again were of two kinds, viz. monasteries and lauræ. (See MONASTERY and LAURA.) Those we call monks now-a-days are cœnobites, who live together in a convent or monastery, who make vows of living according to a certain rule established by the founder, and wear a habit which distinguishes their order. Those that are endowed, or have a fixed revenue, are most properly called monks, *monachi*; as the Chartreux, Benedictines, Bernardines, &c. The Mendicants, or those that beg, as the Capuchins and Franciscans, are more properly called religious and friars; though the names are frequently confounded.

The first monks were those of St. Antony; who, towards the close of the fourth century, formed them into a regular body, engaged them to live in society with each other, and prescribed to them fixed rules for the direction of their conduct. These regulations, which Antony had made in Egypt, were soon introduced into Palestine and Syria by his disciple Hilarion. Almost about the same time, Aones or Eugenius, with their companions Gaddanas and Azyzas, instituted the monastic order in Mesopotamia and the adjacent countries; and their example was followed with such rapid success, that in a short time the whole east was filled with a lazy set of mortals, who abandoning all human connections, advantages, pleasures, and concerns, wore out a languishing and miserable life, amidst the hardships of want, and various kinds of suffering, in order to arrive at a more close and rapturous communication with God and angels.

From the east this gloomy institution passed into the west, and first into Italy and its neighbouring islands; though it is uncertain who transplanted it thither. St. Martin, the celebrated bishop of Tours, erected the first monasteries in Gaul, and recommended this religious solitude with such power and efficacy, both by his instructions and his example, that his funeral is said to have been attended by no less than 2000 monks. From hence the monastic discipline extended gradually its progress through the other provinces and countries of

Europe. There were besides the monks of St. Basil (called in the east *calogeri*, from καλος γερων, good old man), and those of St. Jerom, the hermits of St. Augustine, and afterwards those of St. Benedict and St. Bernard; at length came those of St. Francis and St. Dominic, with a legion of others; all which see under their proper heads.

Anciently the monks were all laymen, and were only distinguished from the rest of the people by a particular habit and an extraordinary devotion. Not only the monks were prohibited the priesthood, but even priests were expressly prohibited from becoming monks, as appears from the letters of St. Gregory. Pope Syricius was the first who called them to the clericate, on occasion of some great scarcity of priests, that the church was then supposed to labour under: and since that time the priesthood has been usually united to the monastical profession in Roman catholic countries.

MONK FISH, in ichthyology. See SQUALUS.

MONK'S-HOOD, in botany. See ACONITUM.

MONK'S RHUBARB. See RUMEX.

MONKERY. *s.* (from *monk.*) The monastic life.

MONKEY, in mastiology. See SIMIA.

MONKEY FLOWER, in botany. See MIMULUS.

MONKEY'S BEARD. See ADANSONIA.

MONKISH. *a.* (from *monk.*) Monastic; pertaining to monks (*Smith*).

MONMOUTH, the capital of the county of Monmouth in England, 129 miles from London.—It has its name from its situation at the conflux of the Monow or Mynwy, and the Wye, over each of which it has a bridge, and a third over the Frothy.—Here was a castle in William the Conqueror's time, which Henry III. took from John baron of Monmouth. It afterwards came to the house of Lancaster, who bestowed many privileges upon the town. Here Henry V. surnamed *of Monmouth*, was born. The famous historian Geoffrey was also born at this place. Formerly it gave the title of earl to the family of Carey, and of duke to king Charles the second's eldest natural son; but now of earl to the Mordaunts, who are also earls of Peterborough. It is a populous and well built place, and carries on a considerable trade with Bristol by means of the Wye. It has a weekly market, and three fairs. In 1801 the number of inhabited houses in Monmouth was 638, of inhabitants 3,345, of electors about 800. Lat. 51. 49 N. Lon. 2. 46 W.

MONMOUTHSHIRE, a county of England; anciently reckoned a part of Wales, but in Charles the Second's time taken into the Oxford circuit, and made an English county. It is bounded on the north by Herefordshire, on the east by Gloucestershire, on the south by the river Severn, and on the west by the Welch counties of Brecknock and Glamorgan. Its extent from north to south is about thirty miles, from east to west twenty-six, and in circumference 110. It is subdivided into six hundreds; and contains seven market-towns, 127 parishes. In 1801 it contained 8,048 houses, and 9,903 families; the whole population amounting to 45,582 persons. It sends only three members to parliament, that is, one for Monmouth, and two for the county. The air is temperate and healthy; and the soil fruitful, though mountainous and woody. The hills feed sheep, goats, and horned cattle; and the valleys produce plenty of grass and corn. This county is extremely well watered by several fine rivers; for, besides the Wye, which parts it from Gloucestershire, the Mynow, which runs between it and Herefordshire, and the Rumney, which divides it from Glamorganshire, it has, peculiar to itself, the Usk, which enters this county a little above Abergavenny, runs mostly southward, and falls into the Severn by the mouth of the Edwith; which last river runs from north to south in the western side of the county. All these rivers, especially the Wye and Usk, abound with fish, particularly salmon and trout.

MONNIER (Peter Charles Le), was born at Paris on the 20th of November 1715. The profession of his father, or the rank which he held in society, we have not learned; and we are equally ignorant of the mode in which he educated his son. All that we know is that young Monnier, from his earliest years, devoted himself to the study of astronomy; and that when only sixteen years of age, he made his first observation, viz. of the opposition of Saturn. At the age of twenty he was nominated a member of the Royal Academy of Sciences at Paris. In the year 1735 he accompanied Maupertuis in the celebrated expedition to Lapland, to measure a degree of latitude. In 1748 he went to Scotland with lord Macclesfield, to observe the annular eclipse of the sun, which was most visible in that country; and he was the first astronomer who had the pleasure to measure the diameter of the moon on the disk of the sun.

Louis XV. it is well known, was extremely fond of astronomy, and greatly honoured its professors: he loved and esteemed Le Monnier. "I have seen the king himself (says Lalande) come out of his cabinet, and look around for Le Monnier; and when his younger brother was presented to him on his appointment to the office of first physician, his majesty was pleased to wish him the merit and reputation of his brother the astronomer." All the remarkable celestial phenomena were always observed by the king, in company with Le Monnier. Thus he observed with him at his chateau of St. Hubert, the two celebrated transits of Venus through the disk of the sun in the years 1761 and 1769; as appears from the Memoirs of the Royal Parisian Academy of Sciences. It well deserves to be here recorded in what manner the king behaved during these important observations, and how little he disturbed his astronomers (the celebrated La Condamine being likewise permitted to observe the transit in his presence) in this

occupation; the proper time for which, if permitted to pass by, could not be recalled. Le Monnier relates in his Dissertation, that "his majesty perceiving that we judged the last contacts to be of the greatest importance, a profound silence at that moment reigned around us." At the transit of Venus in 1769, the king allowed the marquis de Chabert, an intelligent and expert naval officer, who was just returned from a literary voyage to the Levant, to assist at the observation. In a court like that of Louis XV. so scrupulously observant of etiquette, these will be allowed to have been most distinguished marks of honour, and of royal favour and condescension.

In the year 1750, Le Monnier was ordered to draw a meridian at the royal chateau of Bellevue, where the king frequently made observations. The monarch on this occasion rewarded him with a present of 15,000 livres; but Le Monnier applied this sum of money likewise in a manner that redounded to the honour of his munificent sovereign and of his country, by procuring new and accurate instruments, with which he afterwards made his best and most remarkable observations. In 1742 the king gave him in Paris *Rue de la Poste*, a beautiful free dwelling, where, till the breaking out of the revolution, he resided, and pursued his astronomical labours, and where his instruments in part yet remain. Some of them the present French government has, at the instance of Lalande, purchased for the National Observatory. In 1751 the king presented him with a block of marble, eight feet in height, six feet in breadth, and fifteen inches in thickness, to be used for fixing his mural quadrant of five feet. This marble wall, together with the instruments appending to it, turns on a large brass ball and socket, by which the quadrant may be directed from south to north; thus serving to rectify the large mural quadrant of eight feet, which is immoveably made fast to a wall towards the south.

With these quadrants Le Monnier observed, for the long period of forty years, the moon with unwearied perseverance at all hours of the night. It is requisite, to be a diligent astronomer, to be able to conceive to what numberless inconveniencies the philosopher is exposed during an uninterrupted series of lunar observations. As the moon during a revolution may pass through the meridian at all hours of the day or night; the astronomer who, day after day, prosecutes such observations, must be prepared at all, even the most inconvenient, hours, and sacrifice to them his sleep and all his enjoyments. How secluded from all the pleasures of social intercourse, and how fatiguing such a mode of life is, those astronomers, indeed, know not who then only set their pendulum clocks in motion, when some of the eclipses of the sun, moon, or of the satellites of Jupiter, are to be viewed. At this time, and in the present state of the science, these are just the most insignificant observations; and an able astronomer, well supplied with accurate instruments, may every day, if he take into his view the whole of his profession, make more important and more necessary observations.

Le Monnier was Lalande's preceptor, and worthy of such a scholar; and he promoted his studies by his advice, and by every other means in his power. Le Monnier's penetrating mind, indeed, presaged in young Lalande, then only sixteen years old, what in the sequel has been so splendidly confirmed. In his twentieth year he became, on the recommendation of his preceptor, a member of the Royal Academy: and in 1752 he was proposed by him as the fittest person to be sent to Berlin, to make with La Caille's, who had been sent to the Cape of Good Hope, correspondent observations, for the purpose of determining the parallaxes of the moon, then but imperfectly known. Le Monnier lent his pupil for this expedition his mural quadrant of five feet. His zeal for astronomy knew no bounds. For this reason Lalande, in his Notice des Travaux du C. Le Monnier, says of himself: "Je suis moi-même le principal resultat de son zele pour l'astronomie."

Le Monnier was naturally of a very irritable temper: as ardently as he loved his friends, so easily could he be offended; and his hatred was then implacable. Lalande, as he himself expresses it, had the misfortune to incur the displeasure of his beloved preceptor; and he never after could regain his favour. But Lalande's gratitude and respect for him always continued undiminished, and were on every occasion with unremitting constancy publicly declared: patiently he endured from him undeserved ill treatment; so much did he love and esteem his instructor and master to the day of his death. "I have not ceased to exclaim (writes Lalande), as Diogenes exclaimed to his master Antisthenes, You cannot find a stick strong enough to drive me away from you!"

What a noble trait in the character of Lalande, who in 1797 wrote likewise an eulogium on Le Monnier in the style of a grateful pupil, penetrated with sentiments of profound veneration and esteem for his beloved master; but Le Monnier would not read it. This is not the place to give a circumstantial account of this intricate quarrel; we shall only further remark, that Lalande was the warm friend and admirer of the no less eminent astronomer La Caille, whom Le Monnier mortally hated. An intimate friendship likewise subsisted between Le Monnier and D'Alembert; but Lalande had no friendly intercourse with the latter.

Among the scholars of Le Monnier may likewise be reckoned Hennert, the celebrated geometrician and professor of mathematics at Utrecht; who, in a letter to Von Zach, astronomer to the duke of Saxe Gotha, dated the 26th of May, 1797, says, "Le Monnier is a penetrating and philosophical astronomer: I learned much from him in Paris; though I lodged with the late De l'Isle, where I frequently made observations in company with

Messier. Le Monnier was the friend of D'Alembert; and consequently an opposer of Lalande."

This great man, who had, for some years, ceased to exist either for the science of astronomy, or for the comfort of his friends, died at Lizeaux, in the province of Normandy, in 1799, aged 84 years. He left behind him some valuable manuscripts, and a number of good observations; with respect to which he had always been very whimsical, and of which in his latter years he never would publish any thing. He had by him a series of lunar observations, and a multitude of observations of the stars, for a catalogue of the stars, which he had announced so early as the year 1741. The more he was requested to communicate his observations, the more obstinate he became; he even threatened to destroy them. At the breaking out of the revolution, Lalande was greatly alarmed for the safety of these papers; he wished to preserve them from destruction, and made an attempt to get them into his possession; but all his endeavours were in vain. He was only able to learn that Le Monnier had hidden them under the roof of his house. Le Monnier having been first seized with a fit of the apoplexy so early as the 10th of November 1791, Lalande apprehended, lest, if no one except himself should know where he had hidden his papers, the infirm old man might perhaps have himself forgot it. He hopes, however, that La Grange, who married his second daughter, may have some information concerning them. Le Monnier left behind him no son.

MONNIERIA, in botany, a genus of the class diadelphia, order pentandria. Calyx five-parted, the upper division long; corol ringent; filaments two; the upper with two anthers, lower with three; capsules five, one-seeded. One species only; a Guiana plant, with forked stem; ternate leaves; white spiked flowers.

MONOCEROS, unicorn, in astronomy, a southern constellation formed by Hevelius, containing in his catalogue 19 stars, and in the Britannic catalogue 31, viz. 0.0.0.7.10.14.

MONOCEROS, in zoology. See MONODON.

MONOCHORD, a musical instrument wherewith to try the variety and proportion of musical sounds.

The monochord, according to Boethius, is an instrument invented by Pythagoras, for measuring geometrically, or by lines, the quantities and proportions of sounds.

The ancient monochord was composed of a rule divided and subdivided into divers parts, whereon there was a string pretty well stretched upon two bridges at each extreme thereof. In the middle between both was a moveable bridge, called magas, by means of which, in applying it to the different divisions of the line, the sounds were found to be in the same proportion to one another, as the divisions of the line cut by the bridge were.

The monochord is also called the harmonical canon, or canonical rule; because serving to measure the degrees of gravity, and acuteness of sounds. Ptolemy examines his harmonical intervals by the monochord.

There are also monochords with divers strings, and a multitude of fixed bridges; but the use of all these may be supplied by one single moveable bridge; by only shifting it under a new chord or string, which is placed in the middle, and represents the entire sound, or open note, answering to all the divisions on the other bridges.

When the chord was divided into equal parts, so that the terms were as 1 and 1, they called them unisons; if they were as 2 to 1, octaves, or diapasons; when they were as 3 to 2, fifths, or diapentes; if they were as 4 to 3, they called them fourths, or diatessarons; if the terms were as 5 to 4, diton, or a greater third; if as 6 to 5, a demi-diton, or a lesser third; lastly, if as 24 to 25, demi-diton, or diesis.

The monochord, being thus divided, was properly what they call a system, of which there were many kinds, according to the different divisions of the monochord.

Lord Stanhope, who has paid much attention to the subject of musical temperament, has given the following description of a new monochord:

1. The wire is made of steel, which does not keep continually lengthening, like brass or iron. 2. The whole wire forms one straight horizontal line, so that the moveable bridge can be moved without altering the tension of the wire; which is not the case when the wire pulls downwards on the bridges. 3. The ends of the wire are not twisted round the two stout steel pins that keep it stretched; but each end of the wire is soft soldered in a long groove formed in a piece of steel, which goes over its corresponding pin. 4. One of these two steel pins is strongly fastened by a brass slider, which is moved by means of a screw with very fine threads, this screw having a large micrometer head minutely divided on its edge, and a corresponding nonius; whence the tension of the wire may be very exactly adjusted. 5. A slider is fixed across the top of the moveable bridge, and is moved by means of another screw with very fine threads. 6. The slider is adjusted to the steel rod or scale, by means of mechanical contact against projecting pieces of steel firmly fixed on that steel scale, at the respective distances specified in the monochord table. 7. Each bridge carries a metallic finger, which keeps the wire close to the top of such bridge, while the remainder of the wire is made to vibrate. 8. The vibrations of the wire are produced by touching it with a piece of cork with the same elastic force, and always at the distance of one inch from the immoveable bridge.

The Stanhope monochord, though very ingeniously constructed, is in some respects inferior to the monochord contrived by Mr. Atwood. In this gentleman's apparatus the string hangs vertically, its tension being regulated by a weight suspended at its lower extremity, a

little below the place where the string comes into contact with a fixed pulley; the length of the string is terminated at top by a horizontal edge: the other point of termination, which in the common monochord, as well as in many musical instruments, and in the Stanhope monochord, is a bridge over which the string is stretched, is in this construction effected by two steel edges vertically placed, that are capable of approaching, or of receding from, one another, like the cheeks of a vice: these being fixed on a frame worked by micrometer screws, can be easily moved in the vertical direction, so as to alter the length of the string in any desired proportion: these edges are separated occasionally by a spring, in order to let the string pass freely through, when its length is altered, and are closed again, so as to press the string slightly when that length is properly adjusted. By means of this construction the alteration of the tending force, by the application of bridges, &c. is wholly avoided. The scale placed under the string of this monochord is divided into 100 equal parts, and each of these by a micrometer screw into 1000 equal parts; so that by the aid of a microscope and a proper index, the length of a given part of the string may be adjusted on the monochord true to the $\frac{1}{100000}$dth part of its whole length.

The following table contains the chief scales that have hitherto been computed. In column first is given the natural scale, or scale of perfect intervals. The second column contains a new tempered scale, which seems better adapted than any other to keyed instruments, when chiefly designed for lesson-playing, or playing without accompaniments. The third is a scale proposed by Mr. Emerson, in his Mechanics, and since recommended by Mr. Jones in his Physiological Disquisitions, and by Mr. Cavallo in the Philosophical Transactions for 1788. The fourth and fifth exhibit the systems of mean tones, and of equal harmony, calculated by Dr. Smith for instruments of a more perfect construction than those now in use.

Note.	Natural Scale.	Tempered Scale.	Emerson, Jones, &c.	Mean Tones.	Equal Harmony.
C		1000			
C*	937.5	952.9	943.8	957	959.3
D♭				934.5	933
D	888.9	893.3	890.9	894.4	895
D*	833.3	837.5	840.8	856	858.8
E♭				836	835
E	800	798	793.7*	800	801
F♭				781	779
E*				765.6	768.5
F	750	748.1	749.1	747 6	747.4
F*	711.1	712.9	707 1	715.5	717
G♭				698 7	697.3
G	666.7	668.3	667 4	668.7	669
G*	625	632	629.9	640	641.7
A♭				625	624
A	600	597	594 6	598	598.7
A*	562.5	559.7	561.2	572.4	574.4
B♭				559	558.6
B	533.3	533.3	529.7*	535	536
C♭				522.4	521
B*				512	514
C	500	500	500	500	500

N.B. Mr. Jones proposes to have the two numbers which are denoted by stars respectively altered to the numbers 796 and 531.

The method of tuning any instrument by means of the monochord is as follows: First tune the C of the monochord to the concert pitch by means of a tuning-fork; next, put the middle C of the instrument in perfect unison with the C of the monochord: then move the sliding fret to the next division on the scale, and proceed in the same manner with all the several notes and half notes within the compass of an octave. When this is done with accuracy, the other keys are all to be tuned, by comparing them with the octave which is already tempered.—The monochord is here supposed to be made to the pitch of C; but this may be varied at the will of the constructor.

The curious reader who may wish for further information respecting the construction and use of monochords will be highly gratified in perusing the appendix of Mr. Atwood's Treatise on Rectilinear Motion, Mr. Jones's ingenious and entertaining observations on the scale of music, monochord, &c. in his Physiological Disquisitions, Lord Stanhope's Essay on tuning musical instruments, and some interesting papers by Lord Stanhope. Mr. Farey, and others, in various numbers of Tilloch's Philosophical Magazine. See also TEMPERAMENT, and TRUMPET (Marine), in this work.

MONOCOTYLEDONOUS PLANTS. Plants which have only one cotyledon or lobe in the seed; as grasses, palms, and liliaceous plants. Linnéus remarks that these are more properly acotyledonous, since the cotyledon continues within the seed.

MONO'CULAR. MONO'CULOUS. *a.* (μόνος and *oculus.*) One-eyed (*Glanville*).

MONOCULUM. A name given to the cæcum or blind gut by Paracelsus, because perforated only at one end.

MONOCULUS. (*monoculus*, from μονος, one, and *oculus*, an eye.) *Monopia.* A very uncommon species of monstrosity, in which there is but one eye, and that mostly above the root of the nose.

This term however is bad and unclassical, as compounded of two languages. *Monopia* is, on this account, a far better word.

MONOCULUS, in zoology, a genus of the class insecta, order aptera. Legs from four to eight, formed for swimming and very long; body covered with a crust or shell divided into segments: antennas four, two, or none: eyes one or two, approximate and fixed in the shell; feelers four, in continual motion when swimming; the hind ones very small and hook-shaped. Sixty-eight species, found chiefly in Europe, a few in India, commonly in muddy waters or ditches, frequently in sea-waters, often parasitic on fuci, confervæ, ulvæ, and other aquatic plants: many of them inhabit our own ditches or sea-coasts. They may be thus subdivided:

A. With a single eye and crustaceous body.

B. With a single eye and bivalve shell: antennas branched.

C. With a single eye and bivalve shell: antennas simple.

D. With a single eye and bivalve shell: antennas tufted at the tip.

E. With a single eye, and univalve shell: antennas two.

F. Shell univalve: eyes two, placed beneath.

G. Shell bivalve: eyes two, placed on the back.

H. Shell bivalve: eyes two: antennas capillary.

The greater part are minute insects, requiring the assistance of a microscope to investigate their separate organs; a few however deviate from this rule, and especially the two following:

1. M. polyphemus. Molucca or king-crab. Shell orbicular, the suture lunate and toothed behind: tail subulate and very long. Inhabits India, and is the largest known insect, sometimes growing to four feet in length from tail to snout. It is said to be generally found in pairs, the male and female swimming together.

2. M. apus. Shell oblong, truncate and serrate behind; tail ending in two bristles. Inhabits Europe, and is found in the stagnant waters of our own country.

In the new zoological system of Cuvier, Lamark, and Latreille, this genus is removed from the class of insects, and in conjunction with the cancer and oniscus genera, constitute an additional class denominated crustacea, under which term we have given a detailed statement of the new arrangement. See the article CRUSTACEA.

MONODON. Narwhal. In zoology, a genus of the class mammalia, order cete. Teeth two in the upper jaw, extending straight forwards, long, spiral; spiracle on the fore and upper part of the head. One species only, M. monoceros. Skin white, spotted on the head with black; without dorsal fin; two small pectoral fins: head small; eyes very minute. This animal is peculiarly distinguished from every other kind of whale by its very long horn-like tooth, which is perfectly straight, of a white or yellowish white colour, spirally wreathed throughout its whole length, and gradually tapering to a sharp point. It measures from six to nine or ten feet in length, and proceeds from a socket on one side of the upper jaw, having a large cavity at its base or root running through the greater part of its length. In the young animals, and occasionally in the full grown ones, especially in the males, there are two of these teeth, sometimes nearly equal and sometimes very unequal in length, seated close to each other at the base, and running nearly in parallel lines to their extremity. The skin is smooth; and there is a considerable depth of oil or blubber beneath it.

The narwhal chiefly inhabits the northern parts of Davis's Straits: its food consists of the

smaller kinds of flat-fishes, actiniæ, medusæ, and other marine animals. It is principally seen in the unfrozen spots of the northern seas towards the coasts. To such places it resorts in multitudes for the conveniency of breathing, while at the same time it is certain of finding near the shores a due supply of food. It is taken by means of harpoons, and its flesh is eaten by the Greenlanders both raw, boiled, and dried: the intestines and oil are used as a food; the tendons make a good thread, and the teeth serve the purpose of hunting horns, as well as the more important one of building tents and houses: but before this animal was distinctly known to the naturalists of Europe they were held in high estimation, as the supposed horns of unicorns. Various medical virtues were also attributed to them, and they were even numbered among the articles of regal magnificence. A Danish throne is said to be still preserved in the castle of Rosenberg composed entirely of narwhal's teeth.

A specimen of this whale, measuring about eighteen feet, exclusive of the horn or tooth, was some time ago stranded on the coast of Lincolnshire, at no great distance from Boston, and was said to have been taken alive; so that the narwhal may, in consequence, be numbered among the rarer animals of British zoology.

Monodon spurius. Bastard narwhal. An animal nearly resembling the narwhal, but perhaps of a different genus, is given under this name in the Fauna Groenlandica of Fabricius. It has no teeth in the mouth, but from the extremity of the upper mandible two minute, conic, obtuse teeth project, a little curved at the tips, weak, and not above an inch long; body elongated, cylindric, black: pectoral fins two, dorsal fin minute, tail horizontal. Its flesh and oil are considered as very purgative: inhabits the main ocean, seldom approaching the shore. It has been very seldom taken alive, and must be ranked among the rarest of the whale or cete tribe.

MONODY, in ancient poetry, a mournful kind of song, sung by a person all alone, to give vent to his grief. The word is derived from μονος, alone, and ωδω, I sing.

MONŒCIA. (μονος, and οικος, a house.) The name of the twenty-first class in the Linnéan system; comprehending the androgynous plants, or such as produce male and female flowers, on the same individual, without any mixture of hermaphrodites.

MONOGAMY. (compounded of μονος, *solus*, and γαμος marriage.) The state or condition of those who have only married once, or are restrained to a single wife. See Polygamy.

MONOGLOSSUM. (anc. geog.) A mart-town of the Hither India, situated on the Sinus Canthi, into which the Indus empties itself. Said to be Mangalor on the coast of Malabar. Lon. 74 E. Lat. 3 N.

MONOGRAM. A character or cypher, composed of one, two, or more letters interwoven; being a kind of abbreviation of a name, anciently used as a seal, badge, arms, &c.

MONOGYNIA. (from μονος, alone, and γυνη, a woman.) The name of the first order or subdivision in each of the thirteen first classes of the Linnéan system. Comprehending such plants as have one pistil, or stigma only, in a flower.

MO'NOLOGUE. *s.* (μονος and λογος.) A scene in which a person of the drama speaks by himself; a soliloquy (*Dryden*).

MO'NOMACHY. *s.* (μονομαχια.) A duel; a single combat.

MO'NOME, or Monomial. *s.* In algebra, a quantity that has but one denomination or name (*Harris*).

MONOMOTAPA, a kingdom on the eastern coast of Africa, bounded on the north by Monomugi, on the east by the Mosambique, on the south by Sofala and Manica, and on the west by unknown regions. It is watered by several rivers, of which Zambera is the chief. The air is temperate, and the soil fertile in rice and sugar canes, which last grow without cultivation. There are a great many ostriches and elephants, with several mines of gold and silver. The inhabitants are negroes, who have as many wives as they choose to take. Their religion is paganism; but they believe in one God who created the world. The army of the king consists only of foot, for they have no horses in the country. The Portuguese had a settlement here in 1560, but they were all murdered, or forced away. The houses are built of wood, and covered with plaster, but there are very few towns, of which Monomotapa is the chief. Lon. 27. 30 E. Lat. 19. 0 S.

MONOMUGI, a region of Africa, lying near the equator, between Abyssinia on the north, Zanguebar on the east, Monomotapa on the south, and Congo on the west. This country is very little known to the Europeans.

MONONGAHELA, a river of North America, which rises in Virginia, and running north into Pensylvania, meets the Allegany at Fort Pitt, where their united streams assume the name of Ohio. It is deep and gentle, and navigable for barges fifty miles from its mouth.

MONOPETALOUS COROL. In botany, a corol of only one petal. It may be cut deeply, but is not separated at the base. Exemplified in convolvulus, primula, &c.

The most remarkable forms of the monopetalous corol are the bell-shaped, funnel-shaped, salver-shaped, wheel-shaped, and labiate.

MONOPHYL PERIANTH. (μονος, and φυλλον, a leaf.) In botany, a monophyllous or one-leaved perianth. All in one; if cut, not separated to the base. As in datura, primula. Applied also to the involucre.

MONOPHYSITES. (from μονος, *solus*, and φυσις, *natura*.) A general name given to all those sectaries in the Levant, who only own one nature in Jesus Christ; and who maintain that the divine and human nature

of Christ were so united as to form only one nature, yet without any change, confusion, or mixture of the two natures. The monophysites, however, properly so called, are the followers of Severus, a learned monk of Palestine, who was created patriarch of Antioch in 513, and Petrus Fullensis.

The monophysites were encouraged by the emperor Anastasius, but depressed by Justin and succeeding emperors. However, this sect was restored by Jacob Baradæus an obscure monk, insomuch that when he died bishop of Edessa, A. D. 588, he left it in a most flourishing state in Syria, Mesopotamia, Armenia, Egypt, Nubia, Abyssinia, and other countries. The laborious efforts of Jacob were seconded in Egypt and the adjacent countries by Theodosius bishop of Alexandria; and he became so famous that all the monophysites of the east considered him as their second parent and founder, and are to this day called jacobites, in honour of their new chief.

MONOPOLI, an episcopal town of Naples, in Terra di Bari, seated on the gulf of Venice, twenty-eight miles S. E. of Bari. Lon. 17. 37 E. Lat. 41. 20 N.

MONO'POLIST. *s.* (*monopoleur*, Fr.) One who by engrossing or patent obtains the sole power or privilege of vending any commodity.

To MONO'POLIZE. *v. a.* (μονος; and πωλεω.) To have the sole power or privilege of vending any commodity (*Arbuthnot*).

MONO'POLY. *s.* (μονοπωλια.) The exclusive privilege of selling any thing (*Shaks.*).

MONO'PTOTE. *s.* (μονος and πτωσις.) A noun used only in some one oblique case.

MONOSPERMOUS PLANT. A plant that has one seed to each flower. As in polygonum, and collinsonia. A monospermous or one-seeded plant.

Monospermous berry. A one-seeded berry; called monopyrena by the older botanical writers.

MO'NOSTACH CAULIS. (μονος, and σταχυς, a spike.) In botany, a stem bearing a single spike.

MONO'STICH. *s.* (μονοςιχον.) A composition of one verse.

MONOSYLLA'BICAL. *a.* (from *monosyllable.*) Consisting of words of one syllable.

MONOSY'LLABLE, in grammar, a word that consists only of one syllable, and is composed either of one or more letters pronounced at the same time. The too frequent use of monosyllables has a very bad effect in English poetry, as Mr. Pope both intimates and exemplifies in the same verse, viz.

"And ten slow words oft creep in one dull line."

MONOSY'LLABLED. *a.* (from *monosyllable.*) Consisting of one syllable (*Cleaveland*).

MONOTHELITES. (compounded of μονος, single, and θελημα, will, of θελω, *volo*, I will.) An ancient sect, which sprung out of the Eutychians; thus called, as only allowing of one will in Jesus Christ. The opinion of the Monothelites had its rise in 630, and had the emperor Heraclius for an adherent: it was the same with that of the Acephalous Severians. They allowed of two wills in Christ, considered with regard to the two natures; but reduced them to one, by reason of the union of the two natures; thinking it absurd there should be two free wills in one and the same person. They were condemned by the sixth general council in 680, as being supposed to destroy the perfection of the humanity of Jesus Christ, depriving it of will and operation. Their sentiments were afterwards embraced by the Maronites.

MONOTONY, an uniformity of sound, or a fault in pronunciation, when a long series of words are delivered in one unvaried tone. See Reading.

MONOTROPA. Bird's nest. In botany, a genus of the class decandria, order monogynia. Calyxless; petals ten; the five outermost hollowed at the base, and producing honey; capsule five-valved, a fifth part of the fructification often wanting. Two species; one common to the pine woods of our own country; the other a North American plant, the orobanche of Catesby.

MONPAZIER, a town of France, in the department of Dordogne, eighteen miles S. W. of Sarlat. Lon. 0. 47 E. Lat. 44. 46 N.

MONREALE, a town of Sicily, in Val di Mazara. It was erected into a bishopric in 1183, which has been suppressed, and the revenues appropriated to the marine, and the defence of the island against corsairs. It is three miles W.S.W. of Palermo.

MONRO (Alexander), a celebrated physician, was born in Scotland in 1697. He studied at Leyden, and contracted an intimate friendship with Boerhaave. In 1719 he returned to Edinburgh, where he read lectures on anatomy. He died in 1767, after publishing some valuable works; as, 1. Osteology; 2. Anatomy of the Nerves, 3. Several papers in the Medical Essays of Edinburgh; 4. On the Success of Inoculation in Edinburgh.

Monro (John), an eminent physician, was born at Greenwich in Kent, of a Scotch family, in 1715, and educated at Merchant Taylors' school, London, from whence he was removed to St. John's college, Oxford, of which he became fellow. He studied physic at various universities, and was honoured with his doctor's degree by that of Oxford while he was abroad. In 1757 he was appointed joint physician with his father to Bridewell and Bethlem hospitals. He published an excellent answer to Dr. Battie's treatise on Madness. He died in 1791.

Monro (Alexander), an episcopal divine, was born in Rossshire in 1648, and educated at King's college, Aberdeen, where he was chosen professor of philosophy. In 1686 he was appointed principal of Edinburgh, and died in 1713. He wrote several pieces against the presbyterians.

MONS, an ancient, large, handsome, rich, and very strong city of the Austrian Netherlands, in Hainault. There is a chapter, con-

sisting of thirty ladies of distinction, who have the liberty of leaving the community when they intend to marry. They have several manufactures, and a good trade. It was taken by the allies in 1709, and by the French in July 1746; but rendered back by the treaty of Aix-la-Chapelle, after the fortifications were demolished. It stands partly on a hill, and partly on a plain in a marshy soil, on the rivers Haine and Trouilli, by which the country about it may be overflowed at pleasure. It was taken by the French in 1794. Lon. 4. 31 E. Lat. 50. 25 N.

MONS SACER. (anc. geog.) A mountain of the Sabines beyond the Anio, to the east of Rome; whither the common people retired once, and again to avoid the tyranny of the patricians. From this secession, and the altar of Jupiter Terribilis erected there, the mountain took its name.

MONSEIGNEUR. (in the plural *Messeigneurs.*) A title of honour and respect used by the French in writing to persons of superior rank or quality, before the late abolition of all ranks. Dukes, peers, archbishops, bishops, and presidents *à la mortier*, were complimented with the title of Monseigneur. In the petitions presented to the sovereign courts, they used the term Messeigneurs.

MONSELEMINES, a people inhabiting that part of Biledulgerid which borders on the territories of the emperor of Morocco.

MONSIEUR. (in the plural *Messieurs.*) A term or title of civility used by the French in speaking to their equals, or those a little below them, answering to Mr. or Sir among the English. The republicans however have taken pains to abolish this with other titles of distinction, and endeavour to substitute for it the indiscriminating appellation of Citoyen.

MONSIEUR, absolutely used, was a title or quality appropriated to the second son of France, or the king's brother. The king was also called Monsieur; but that only by the children of France.

MONSONIA, in botany, a genus of the class monadelphia, order dodecandria. Calyx five-leaved; petals five; stamens fifteen, united, with the cup connecting them five-cleft; style five-cleft; fruit separating into five one-seeded capsules, each tipped with a long terminal awn. Five species, natives of the Cape, and bearing, in their flower, a considerable resemblance to the geranium. They should be treated as hardy green-house plants; and, as their seeds seldom ripen among us, they are best propagated by cuttings of the root.

MONSOON, a regular or periodical wind in the East Indies, blowing constantly the same way during six months of the year, and the contrary way the remaining six. In the Indian ocean the winds are partly general, and blow all the year round the same way, as in the Ethiopic ocean; and partly periodical, i. e. half the year blow one way, and the other half near on the opposite points; and those points and times of shifting differ in different parts of this ocean. These latter are what we call monsoons. The shifting of these monsoons is not all at once; and in some places the time of the change is attended with calms, in others with variable winds; and particularly those of China, at ceasing to be westerly, are very subject to be tempestuous; and such is their violence, that they seem to be of the nature of the West India hurricanes, and render the navigation of those seas very unsafe at that time of the year. These tempests the seamen call the breaking up of the monsoons.

Monsoons, then, are a species of what we otherwise call trade-winds. They take the denomination monsoon from an ancient pilot, who first crossed the Indian sea by means hereof;—though others derive the name from a Portuguese word, signifying motion, or change of wind and sea.

Lucretius and Apollonius make mention of annual winds which arise every year, *etesia flabria*, which seem to be the same with what in the East Indies we now call monsoons. For the physical cause of these winds, see WIND.

MO'NSTER. *s.* (*monstrum*, Latin.) 1. Something out of the common order of nature (*Locke*). 2. Something horrible for deformity, wickedness, or mischief (*Pope*).

To MO'NSTER. *v. a.* (from the noun.) To put out of the common order of things (*Sh.*).

MONSTER, in anatomy, a *lusus naturæ*, or sport of nature, by which the young of any class of animals is born mis-shapen; either from deficiency, redundance, or confusion of parts.

To these might perhaps be added, without impropriety, another kind, in which there is neither redundance, nor deficiency, nor confusion of parts, but an error of place, as in transpositions of the viscera. But children born with diseases, as the hydrocephalus, or their effects, as in some cases of blindness from previous inflammation, cannot be properly considered as monsters, though they are often so denominated.

Of the first order there may be two kinds, redundance or multiplicity of natural parts, as of two heads and one body, of one head and two bodies, an increased number of limbs, as legs, arms, fingers, and toes; or excrescences or additions to parts of no certain form, as those upon the head and other parts of the body, and these are usually more or less important according to their size or the part where they grow. But as such excrescences, whatever may be their size, have, from their texture, a disposition to enlarge, and to assume a morbid action, it is become an established rule to extirpate them whenever it can be done with safety.

2d, Of monsters from deficiency or want of parts, the instances are less frequent than those of the former kind, as of the brain and back part of the head, or of the whole head, as in the acephalus; or of one eye, as in the monoculus; of the lip and palate, as in the

hare-lip; of one or both arms; of the fore-arm or hand; of one or more fingers; of a portion or of the whole of the spinal processes of the vertebæ, as in the spina bifida; of the incomplete formation of the skin, most frequently at the navel, or some part of the abdomen; of the penis, especially of the prepuce; of one or both of the inferior extremities; of the heart, of the liver, spleen, or any of the abdominal viscera; of the lower part of the rectum, terminating before it reaches the anus; and many others.

3d, Monsters from confusion of parts, as when the whole body is in one mass (usually called a mole), in which various parts of the child are found lying together in apparent confusion; of parts adhering together, as of the fingers and toes; of the rectum, as in the closure of the anus: of the vagina; of the external or internal parts of generation, as in those called hermaphrodites; of the two inferior extremities connected together and terminating in a point; of the club foot; and many others.

As we are ignorant of the manner in which the primordial parts of a regular conception are formed and established, and, in many respects, of the order in which the various parts of a fœtus are unfolded or enlarged, it is not surprising that we should be ignorant also of the manner in which monsters or irregular births are generated or produced; though it is probable that the laws by which these are governed are as regular, both as to cause and effect, as in common or natural productions. Formerly, and indeed till within these few years, it was a generally-received opinion, that monsters were not primordial or aboriginal, but that they were caused subsequently by the power of the imagination of the mother, transferring the imperfection of some external object, or the mark of something for which she longed, with which she was not indulged, to the child of which she was pregnant; or by some accident which happened to her during her pregnancy. Such opinions, it is now said, were permitted to pass current, in order to protect pregnant women from all hazardous and disagreeable occupations, to skreen them from severe labour, and to procure for them a greater share of indulgence and tenderness than could be granted to them in the common occurrences of life. The laws and customs of every civilised nation have, it is added, in some degree, established a persuasion that there was something sacred in the person of a pregnant woman: and this may be right in several points of view; but these go a little way towards justifying the opinion of monsters being caused by the imagination of the mother. The opinion has been attempted to be disproved by common observation, and by philosophy, not perhaps by positive proofs, but by many strong negative facts; as the improbability of any child being born perfect, had such a power existed; the freedom of children from any blemish, their mothers being in situations most exposed to objects likely to produce them; the ignorance of the mother of any thing being wrong in the child, till, from information of the fact, she begins to recollect every accident which happened during her pregnancy, and assigns the worst or the most plausible as the cause; the organization and colour of these adventitious substances; the frequent occurrence of monsters in the brute creation, in which the power of the imagination cannot be great; and the analogous appearances in the vegetable system, where it does not exist in any degree.

We believe the older opinion to be more correct and philosophical than the newer. We have no doubt that it is well supported by an accumulation of facts that cannot be otherwise explained: while the whole that can be urged from those advanced above is (not that they are in opposition to it but) that they do not directly support it, and may be explained upon a different principle. The power of the mind which affects the capillaries of the skin, and makes us blush or turn pale, excites an ague or a perspiration, according to the feeling of the moment, may easily be conceived to exercise an influence upon the womb, which is the most subject to mental influence of all the organs of the frame.

MONSTRO'SITY. MONSTRUO'SITY. *s.* (from *monstrous*). The state of being monstrous, or out of the common order of the universe (*Bacon. Shakspeare*).

MO'NSTROUS. *a.* (*monstrosus*, Latin.) 1. Deviating from the stated order of nature (*Locke*). 2. Strange; wonderful (*Shakspeare*). 3. Irregular; enormous (*Pope*). 4. Shocking; hateful (*Bacon*).

MO'NSTROUS. *ad.* Exceedingly; very much. A cant term (*Bacon*).

MO'NSTROUSLY. *ad.* (from *monstrous.*) 1. In a manner out of the common order of nature; shockingly; terribly; horribly (*South*). 2. To a great or enormous degree (*Dryden*).

MO'NSTROUSNESS. *s.* (from *monstrous.*) Enormity; irregular nature or behaviour (*Sh.*)

MONT-ALBAN, a strong town of Spain, in the kingdom of Arragon, with a strong citadel; seated on the river Riomartin, 44 miles south of Saragossa, and 92 north by west of Valencia. Lon. 0. 30 W. Lat. 41. 9 N.

MONT-BLANC. See BLANC (Mont).

MONT-DIDIER, a town of France, in the department of Somme and late province of Picardy, where the kings of France formerly had a palace. It is seated on a mountain, 24 miles S.E. of Amiens, and 57 N. of Paris. Lon. 2. 34 W. Lat. 49. 39 N.

MONT-L'HERI, a town of the Isle of France. 15 miles from Paris. Here are the remains of a tower, which may be seen at a great distance. Lon. 2. 0 E. Lat. 48. 38 N.

MONT-LOUIS, a town of France, in the department of the Eastern Pyrennees and late province of Rousillon. It is the capital of the French part of Cerdagna, and has a regular fortress, on a rock, at the foot of the Pyren-

nees, built in 1680, by Louis XIV. for the protection of the frontiers. It is 40 miles W.S.W. of Perpignan, and 430 S. of Paris. Lon. 2. 5 E. Lat. 42. 30 N.

MONT-LUET, a town of France, in the department of Ain and late province of Bresse, seated on the Seraine, 12 miles N.E. of Lyons, and 205 S.E. of Paris. Lon. 5. 8 E. Lat. 45. 49 N.

MONT-LUZON, a town of France, in the department of Allier and late province of Bourbonnois, seated on the Cher, 35 miles S.W. of Moulins, and 150 S. of Paris. Lon. 2. 45 E. Lat. 46. 22 N.

MONTABOUR, a small fortified town of Germany, in the electorate of Treves, between Coblentz and Limpurg. Lon. 7. 50 E. Lat. 50. 30 N.

MONTAGNIAC, a considerable town of Asia, in Natolia, and in the province of Bec-Sangel, on the sea of Marmora. It carries on a great trade, especially in fruits, and is seated on a bay of the same name, 12 miles from Bursa, and 60 S.E. of Constantinople. Lon. 29. 40 E. Lat. 40. 20 N.

MONTAGUE (Edward), Earl of Sandwich, who perished in the great Dutch fight in which the duke of York commanded in 1672. He translated the Art of Metals, in which is declared the manner of their generation, and the concomitants of them, from the Spanish, 8vo. His Letters have also been published, in 2 vols. 8vo.

MONTAGUE (Lady Mary Wortley), an ingenious English lady. She accompanied her husband, who was appointed ambassador, to Constantinople; and wrote an account of her travels, which is very entertaining. She is also celebrated for having introduced the practice of inoculation into England.

MONTAGUE (Edward Wortley), son of the preceding lady. He was an extraordinary character. When a boy at Westminster school he eloped, and was found in the disguise of a chimney-sweeper; afterwards he connected himself with a fisherman; and next he went as a cabin-boy on board a vessel to Spain, in which country he became servant to a mule-driver. In this situation he was discovered and restored to his friends, who sent him to the West Indies; on his return from whence he became a member of parliament, and behaved himself for some time in a manner suited to his rank. At length the fit of rambling returned, and he went to the East, where he adopted all the manners of the Turks, and died in 1776. He wrote, 1. Observations on the Rise and Fall of the Roman Empire; 2. An Examination into the Causes of Earthquakes.

MONTAGUE-ISLAND, one of the Hebrides, in the South Sea, near Sandwich Island. Lon. 138. 37 E. Lat. 17. 26 S.

MONTAIGNE (Michel de), a French gentleman, was born in Perigord in 1533. His father educated him with great care, and made him learn Latin as other children learn their mother-tongue. His tutors were Nicholas Groschi, who wrote De Comitiis Romanorum: William Guerenti, who wrote on Aristotle; George Buchanan; and M. Ant. Muret. He was also taught Greek by way of recreation; and because some think that starting children out of their sleep spoils their understanding, he was awakened every morning with the sound of music. He was counsellor for a while in the parliament of Bourdeaux; afterwards made mayor of Bourdeaux. He published his Essays, so much known in the world, in 1580 Montaigne had a great deal of wit and subtlety, but no small share of conceit and vanity. The learned and ingenious are much divided in their opinion about his works. He died in 1592.

MONTALCINO, a small populous town of Italy, in Tuscany, and in the territory of Sienna, with a bishop's see. It is seated on a mountain, 17 miles S.E. of Sienna, and 44 S.E. of Florence. Lon. 11. 30 E. Lat. 45. 7 N.

MONTALTO, an episcopal town of Italy, in the Marca of Ancona; seated on the river Monacio, 10 miles north of Ascoli, and 45 south of Ancona. Lon. 13. 30 E. Lat. 44. 54 N.

MONTANINI (Pietro), called Petruccio Perugino, an eminent landscape painter, was born at Perugia in 1619. At first he was instructed by his uncle Pietro Barsotti; but was afterwards placed as a disciple with Ciro Ferri. Yet he did not long adhere to the manner of either of those masters, choosing preferably to study under Salvator Rosa; and he imitated the style of that celebrated painter with exceeding great success. The taste of his landscapes was generally admired; the rocks, situations, torrents, and abrupt precipices, were designed with spirit, and in a grand style; and his figures recommended themselves to the eye by a very uncommon correctness, propriety, and elegance. He died in 1689.

MONTANISTS, Christian heretics, who sprung up about the year 171, in the reign of the emperor Marcus Aurelius. They were so called from their leader Montanus, a Phrygian by birth; whence they are sometimes styled Phrygians and Cataphrygians.

Montanus, it is said, embraced Christianity in hopes of rising to the dignities of the church. He pretended to inspiration; and gave out that the Holy Ghost had instructed him in several points which had not been revealed to the apostles. Priscilla and Maximilla, two enthusiastic women of Phrygia, presently became his disciples; and in a short time he had a great number of followers. The bishops of Asia, being assembled together, condemned his prophecies, and excommunicated those who dispersed them. Afterwards they wrote an account of what had passed to the western churches, where the pretended prophecies of Montanus and his followers were likewise condemned.

The Montanists, finding themselves exposed to the censure of the whole church, formed a schism, and set up a distinct society under the

direction of those who called themselves prophets. Montanus, in conjunction with Priscilla and Maximilla, was at the head of the sect.

MONTARGIS, a considerable town of France, in the department of Loiret and late province of Orleanois. Its mustard and cutlery are excellent; and from the river Loing is a navigable canal hence to the Seine. It is seated near a fine forest, 15 miles S. of Nemours, and 62 S. by E. of Paris.

MONTAUBON, a commercial town of France, in the department of Lot, lately the episcopal see of the province of Querci. The inhabitants amount to 40,000; and have manufactures of silk stockings and stuffs, serges, shalloons, &c. This town was taken from the Huguenots in 1629, and the fortifications were demolished. It is seated on an eminence, on the river Tarn, 20 miles N. of Toulouse, and 30 S. of Cahors.

MONTBAZON, a town of France, in the department of Indre and Loire and late province of Touraine, seated at the foot of a hill, on which is an ancient castle, 135 miles S.W. of Paris. Lon. 0. 45 E. Lat. 47. 1 N.

MONTBELLIARD, a strong town of France, capital of a principality of the German empire, of the same name, between the department of Doubs and that of Upper Rhine. It is seated at the foot of a rock, on which is a citadel. It was taken in 1674 by the French, who demolished the fortifications; but it was restored to the prince. It is seated near the Alaine and Doubs, 33 miles W. of Basle, and 45 N.E. of Besancon. Lon. 6. 50 E. Lat. 4. 31 N.

MONTBLANC, one of the highest mountains of the Alps, in Savoy, so called from its uncommonly white appearance. It is 15,662 feet above the level of the sea, which is 414 feet higher than the peak of Teneriff. The summit was deemed inaccessible till 1786, when Dr. Paccard ascended it. The French have given the name of this mountain to the conquered duchy of Savoy, as an eighty-fourth department of France.

Montblanc, a town of Spain, in Catalonia, 15 miles N. of Tarragona. Lon. 1. 5 E. Lat. 41. 10 N.

MONTBRISON, a town of France, in the department of Rhone and Loire and late province of Forez, seated on the Vezize, 40 miles W. of Vienne, and 250 S.E. of Paris. Lon. 4. 27 E. Lat. 45. 32 N.

MONTECCHIO, a considerable town of Italy, in the duchy of Reggio, 10 miles S. E. of Parma, and 8 N.W. of Reggio. Lon. 15. 54 E. Lat. 38. 8 N.

MONTE-FALCO, a town of Italy, in the territory of the church and duchy of Spalatto: seated on a mountain near the river Clitunno, 12 miles west of Spalatto. Lon. 12. 40 E. Lat. 42. 58 N.

Monte-Falcone, a town of Italy, in Venetian Friuli, with a castle, near the river Ponzano, 12 miles N.W. of Triest. Lon. 13. 0 E. Lat. 46. 4 N.

Monte-Fiascone, a populous town of Italy, in the territory of the church, with a bishop's see. It is seated on a mountain, near the lake Bolsena, 12 miles S.W. of Orvietto, and 45 N.W. of Rome. Lon. 12. 4 E. Lat. 42. 26 N.

Monte-Leone, a town of Naples, in Calabria Ulteriore. It was ruined by an earthquake in 1638, and is 12 miles N.E. of Nicotera.

Monte-Marana, a populous town of Naples, in Principata Ulteriore, seated on the Calore, 18 miles S. of Benevento. Lon. 15 0 E. Lat. 40. 48 N.

Monte-Peloso, an episcopal town of Naples, in Basilicata, seated on a mountain, near the river Basiento, 14 miles E. of Cirenza. Lon. 16. 28 E. Lat. 40. 46 N.

Monte-Pulciano, a town of Tuscany, with a bishop's see. It is seated on a mountain, near the river Chiana, in a country noted for excellent wine, 25 miles S.E. of Sienna, and 50 S. by E. of Florence. Lon. 11. 49 E. Lat. 43. 10 N.

Monte-Sancto, formerly Mount-Athos, a mountain of Turkey in Europe, on the gulf of Contessa. It is called Monte-Sancto, or Holy Mount, because there are 22 monasteries thereon, in which are 4000 monks, who never suffer a woman to come near them. It is 17 miles S. of Salonichi. Lon. 24. 39 E. Lat. 40. 27 N.

Monte-Santo, a town of Portugal, in Beira, 6 miles N. of Idanha a Velha.

MONTEGO, a seaport, on a bay of the same name, on the N. side of the island of Jamaica. In June 1795 a fire consumed an immense quantity of stores, and great part of the town. Lon. 78. 5 W. Lat. 18. 40 N.

MONTELIMAR, a commercial town of France, in the department of Drome, with an ancient citadel. The inhabitants, in the 16th century, were the first to embrace the reformed religion. It is seated in a fertile plain, 25 miles S. of Valence, and 325 S. by E. of Paris. Lon. 4. 55 E. Lat. 44. 33 N.

MONTEMOR-O-NOVO, a town of Portugal, in Estremadura, 50 miles E. by S. of Lisbon. Lon. 15. 0 E. Lat. 38. 42 N.

Montemor-o-velho, a town of Portugal, in Beira, with a castle, 10 miles S.W. of Coimbra, and 83 N. Lisbon. Lon. 8. 9 W. Lat. 40. 5 N.

MONTESA, a strong town of Spain, in Valencia, which is the seat of an order of knighthood of the same name. It is five miles N.W. of Xativa. Lon. 0. 30 W. Lat. 39. 0 N.

MONTESQUIEU (Charles de Secondat), baron, a most illustrious Frenchman descended from an ancient and noble family of Guienne, was born at the castle of La Brede, near Bourdeaux, in 1689. The greatest care was taken of his education; and at the age of 20 he had actually prepared materials for his Spirit of Laws, by well digested extracts from those immense volumes of civil law which he had studied, not barely as a civilian, but as a philosopher. He became a counsellor of the parliament of Bourdeaux in

1714, and was received president a mortier two years after. In 1721 he published his Persian Letters; in which, under the screen of Oriental manners, he satirized those of France, and treated of several important subjects by delicate and transient glances: he did not avow this publication; but was no sooner pointed out as the author, than zeal without knowledge, and envy under the mask of it, united at once against the Persian Letters. He was received into the French Academy in 1728; and having previously quitted his civil employments, he entirely devoted himself to his genius, and was no longer a magistrate, but a man of letters. Having thus set himself at liberty, he travelled through Germany, Italy, Switzerland, Holland, and England, in which last country he resided three years, and contracted intimacies with the greatest men then alive; for Locke and Newton were dead. The result of his observations was, that Germany was fit to travel in, Italy to sojourn in, England to think in, and France to live in. On his return he retired for two years to his estate at La Brede, where he finished his work On the Causes of the Grandeur and Declension of the Romans; which appeared in 1734. The reputation acquired by this last work only cleared the way for his greater undertaking, the Spirit of Laws, which was printed at Geneva in 2 vols. 4to. 1750. This was immediately attacked by the adversaries of his Persian Letters, in a multitude of anonymous pamphlets, containing all the reproaches to which a liberal mind is exposed from craft and ignorance. M. Montesquieu drew up a defence of this work; which for truth, moderation, and delicacy of ridicule, may be regarded as a model in its way. This great man was peaceably enjoying that fulness of esteem which his great merits had procured him, when he fell sick at Paris, and died on the 10th of February 1755.—The following character of this great man is drawn by lord Chesterfield: "His virtues did honour to human nature, his writings justice. A friend to mankind, he asserted their undoubted and unalienable rights with freedom, even in his own country; whose prejudices in matters of religion and government he had long lamented, and endeavoured, not without some success, to remove. He well knew, and justly admired, the happy constitution of this country, where fixed and known laws equally restrain monarchy from tyranny, and liberty from licentiousness. His works will illustrate his name, and survive him, as long as right reason, moral obligation, and the true spirit of laws, shall be understood, respected, and maintained." As to his personal qualities, we are told by his eulogist, M. d'Alembert, that "he was of a sweet, gay, and even temper. His conversation was spirited, agreeable, and instructive. Nobody told a story in a more lively manner, or with more grace and less affectation. He had frequent absence of mind; but always awakened from it by some unexpected stroke that re-animated the languishing conversation. Though he lived with the great, he retired whenever he could to his estate in the country, and there met his books, his philosophy, and his repose. Surrounded at his leisure hours with peasants, after having studied man in the commerce of the world, he studied him in those simple people, solely instructed by nature. With them he cheerfully conversed; he endeavoured, like Socrates, to find out their genius, and appeared as happy with them as in the most brilliant assemblies; especially when he reconciled their differences, and by his beneficence relieved them from their distresses."

The following interesting story we present on the authority of Mr. Moirhead of Glasgow, in his Travels in the Low Countries:

'A young man, named Robert, sat alone in his boat, in the harbour of Marseilles. A stranger had stept in and taken his seat near him, but quickly rose again; observing, that, since the master had disappeared he would take another boat. "This, Sir, is mine,"— said Robert,—"would you sail without the harbour?" "I meant only to move about in the bason, and enjoy the coolness of this fine evening.—But I cannot believe you are a sailor." "Nor am I—yet on Sundays and holidays I act the bargeman, with a view to make up a sum."—"What! covetous at your age!—your looks had almost prepossessed me in your favour."—"Alas! Sir, did you know my situation you would not blame me."— "Well—perhaps—I am mistaken—let us take our little cruize of pleasure, and acquaint me with your history."

'The stranger having resumed his seat, the dialogue, after a short pause, proceeded thus: —"I perceive, young man, you are sad— what grieves you thus?" "My father, Sir, groans in fetters, and I cannot ransom him. He earned a livelihood by petty brokerage, but, in an evil hour, embarked for Smyrna, to superintend in person the delivery of a cargo, in which he had a concern. The vessel was captured by a Barbary corsair, and my father was conducted to Tetuan, where he is now a slave. They refuse to let him go for less than 2000 crowns, a sum which far exceeds our scanty means. However we do our best—my mother and sisters work day and night—I ply hard at my stated occupation of a journeyman jeweller, and, as you perceive, make the most I can of Sundays and holidays. I had resolved to put myself in my father's stead; but my mother, apprized of my design, and dreading the double privation of a husband and only son, requested the Levant captains to refuse me a passage."— "Pray, do you ever hear from your father?— under what name does he pass?—or what is his master's address?"—"His master is overseer of the royal gardens at Fez—and my father's name is Robert at Tetuan, as at Marseilles."—"Robert—overseer of the royal gardens?"—"Yes, Sir."—"I am touched with your misfortunes—but venture to predict their termination."

'Night drew on apace. The unknown, upon

landing, thrust into young Robert's hand a purse containing eight double louis d'ors, with ten crowns in silver—and instantly disappeared.

'Six weeks had passed since this adventure, and each returning sun bore witness to the unremitting exertions of the good family. As they sat one day at their unsavoury meal of bread and dried almonds, old Robert entered the apartment, in a garb little suited to a fugitive prisoner, tenderly embraced his wife and children, and thanked them with tears of gratitude for the fifty louis they had caused remit to him on his sailing from Tetuan, his free passage, and a comfortable supply of wearing apparel. His astonished relatives eyed one another in silence. At length, madame Robert suspecting her son had secretly concerted the whole plan, recounted the various instances of his zeal. "Six thousand livres," continued she, "is the sum we wanted—and we had already procured somewhat more than the half, owing chiefly to his industry. Some friends, no doubt, have assisted him upon an emergency like the present." A gloomy suggestion crossed the father's mind. Turning suddenly to his son, and eyeing him with the sternness of distraction, "Unfortunate boy," exclaimed he, "what have you done? How can I be indebted to you for my freedom, and not regret it? How could you effect my ransom, without your mother's knowledge, unless at the expence of virtue? I tremble at the thought of filial affection having betrayed you into guilt. Tell the truth at once—and let us all die if you have forfeited your integrity." "Calm your apprehensions, my dearest father," cried the son, embracing him,—"no, I am not unworthy of such a parent, though fortune has denied me the satisfaction of proving the full strength of my attachment—I am not your deliverer—but I know who is.—Recollect, mother, the unknown gentleman who gave me the purse. He was particular in his enquiries. Should I pass my life in the pursuit, I must endeavour to meet with him, and invite him to contemplate the fruits of his beneficence." He then related to his father all that passed in the pleasure-boat, and removed every distressing suspicion.

'Restored to the bosom of his family, Robert again partook of their joys, prospered in his dealings, and saw his children comfortably established. At last, on a Sunday morning, as his son sauntered on the quay, he recognized his benefactor, clasped his knees, and entreated him as his guardian angel, as the saviour of a father and a family, to share the happiness of his own creation. The stranger again disappeared in the crowd—but, reader, this stranger was Montesquieu.'

Besides the works above-mentioned M. Montesquieu wrote several small pieces, as the Temple of Gnidus, Lysimachus, and Essay upon Taste, which is left unfinished. His works have been collected since his death, and printed at Paris in a splendid edition, in quarto. They have likewise all of them been translated into English.

MONTESQUIEU, a town of France, in the department of Upper Garonne, 15 miles S.S.E. of Toulouse.

MONTESQUIOU, a town of France, in the department of Gers, 11 miles W.S.W. of Auch.

MONTETH. *s.* (from the name of the inventor.) A vessel in which glasses are washed.

MONTE VELINO, a mountain of Italy, supposed to be the most lofty part of the Appennines, and 8397 feet above the level of the Mediterranean. It is 46 miles N.E. of Rome.

MONTE-VERDE, a town of Naples, in Principato Ulteriore, with a bishop's see, 60 miles E. of Naples. Lon. 15. 43 E. Lat. 40. 51 N.

MONTEZUMA, the last emperor of Mexico, was a prince of noble qualities. He opposed the invaders of his country with firmness; but at last was seized by Cortes, who forced him to acknowledge himself a vassal of Spain. An insurrection taking place among the Mexicans, Cortes brought forth Montezuma dressed in his royal robes with a view to appease them. The unhappy monarch received two mortal wounds from arrows, of which he shortly after died. He left two sons who embraced the Christian religion, and Charles V. made the eldest Count de Montezuma, and gave him a considerable estate.

MONTFAUCON (Bernard de), a very learned Benedictine of the congregation of St. Maur, singularly famous for his knowledge in pagan and ecclesiastical antiquities, was born of an ancient and noble family in Languedoc, in 1655. He served for some time in the army; but the death of his parents mortified him so with regard to the world, that he commenced Benedictine monk in 1675, and applied himself intensely to study. Though Montfaucon's life was long, healthy, retired, and laborious, his voluminous publications seem sufficiently to have employed the whole; exclusive of his greatest undertaking, for which he will be always memorable. This was his Antiquité expliquée, written in Latin and French, illustrated with elegant plates, in 10 vols. folio; to which he added a supplement of 5 vols. more. He died at the abbey of St. Germain in 1741.

MONT-FERRAND. See CLERMONT.

MONTFERRAT, a duchy of Italy, bounded on the E. by the Milanese and the territory of Genoa, on the N. and W. by Piedmont, and on the S. by the territory of Genoa, from which it is separated by the Apennines. It is very fertile and well cultivated, abounding in corn, wine, oil, and silk; and is subject to the king of Sardinia. Casal is the capital.

MONTFORT, a town of France, in the department of Seine and Oise, 16 miles W. of Versailles. Lon. 2. 50 E. Lat. 48. 45 N.

MONTFORT, a town of France, in the department of Isle and Vilaine, 12 miles W. of Rennes. Lon. 1. 58 W. Lat. 48. 8 N.

MONTFORT, a strong town of the United

Provinces, in Utrecht, with an ancient castle, seated on the Yssel, seven miles S. by E. of Utrecht. Lon. 5. 0 E. Lat. 52. 4 N.

Montfort, a town of Suabia, capital of a country of the same name, subject to the house of Austria. It is 16 miles S. of Lindau and the lake of Constance. Lon. 9. 51 E. Lat. 47. 22 N.

Montfort-de-Lemos, an ancient town of Spain, in Galicia, with a magnificent castle, seated in a fertile country, 25 miles N.E. of Orense, and 55 S.E. of Compostella. Lon. 7. 9 W. Lat. 42. 28 N.

MONTGOLFIER (Stephen James), in biography, famous as the inventor of aerostatic balloons, was born at Annonay, thirty-six miles from Lyons, and there carried on an extensive manufacture of paper, in conjunction with his brother Joseph. They were distinguished for their ingenuity in this branch, and were the first in France who made the beautiful vellum paper. It is said, that the incident of covering a coffee-pot, in which water was boiling, with a spherical cap of paper, which rose in the air as the water heated, first gave him the idea of an air-balloon. Others affirm, that reflecting on the ascent of smoke and clouds in the atmosphere suggested the hint. However this were, it appears that Stephen, in the middle of November, 1782, made an experiment at Avignon with a bag of fine silk, of the shape of a parallelopipedon, and of forty cubic feet in capacity, to the aperture of which he applied burning paper till it was filled with a kind of cloud, when it ascended rapidly to the ceiling. This experiment was repeated by the two brothers at Annonay, with a success that induced them to form a machine of the capacity of six hundred and fifty cubic feet, which filled in like manner with smoke, ascended to the height of six hundred feet. They proceeded enlarging the experiment, till they had constructed a globe of linen, lined with paper, of the capacity of twenty-three thousand four hundred and thirty cubic feet, which, inflated with the smoke of straw and chopped wool, rose to an elevation of about six thousand feet. This power of ascent M. Montgolfier attributed not merely to the rarefaction of the air from the heat (which appears to be the true cause), but to a species of gas specifically lighter than the common air, supposed to be disengaged from the burning substances. When the event of these experiments was reported at Paris, the philosophers of that capital immediately thought of applying, for the purpose of inflation, a gas which they knew to be eight or ten times lighter than common air, namely inflammable air, and trials were immediately made upon that principle, which have proved highly successful. In the mean time Montgolfier continued to extend his plans, and on September 19, 1783, he exhibited before the king and royal family at Versailles a grand machine, near sixty feet high, and forty-three in diameter, which ascended with a cage, containing a sheep, a cock, and a duck, and conveyed them through the air in safety to the distance of above ten thousand feet. Emboldened by this success, M. Pilatre de Rozier first offered himself to undertake the hazardous adventure of an aerial navigation in a new machine of Montgolfier's, of still larger dimensions. After first ascending alone to the height of eighty-four feet, he again seated himself in the car with the marquis d'Arlandes, when they gave all Paris the astonishing spectacle of hovering in the air over that city for about nine minutes at the height of three hundred and thirty feet. This brilliant experiment caused the annual prize of the Academy of Sciences to be awarded to M. Montgolfier, and from that era, October 19, 1783, the atmosphere has been a new field of human daring. The first principle of ascent, however, though applied in various succeeding instances, gradually gave way to the safer and more efficacious one of a gaseous fluid permanently lighter than the air. In one unfortunate instance the two modes were combined, and the result was, that the balloon caught fire, and occasioned the death of the first adventurer, Pilatre de Rozier, and his companion Romain. Montgolfier was rewarded for his discovery by admission into the Academy of Sciences, the cordon of St. Michael, and a pension of two thousand livres. He died in 1799.

MONTGOMERY, the capital of a county of the same name in North Wales, 158 miles from London, took its name from Roger de Montgomery earl of Shrewsbury, who built the castle; but it is called by the Welsh Tre Valdwin, that is, Baldwin's town; having been built by Baldwin, lieutenant of the marches of Wales, in the reign of William I. The Welsh, after having put the garrison to the sword, demolished it in 1095; but Henry III. rebuilt it, and granted it the privileges of a free borough, with other liberties. It is a large and tolerably well built town, in a healthful situation and fertile soil. It sends a member to parliament, and has the title of an earldom. It had formerly a tower and castle; but they were demolished in the civil wars. It has a weekly market and four fairs. Lon. 3. 5 W. Lat. 52. 26 N.

MONTGOMERYSHIRE, a county of North Wales, 36 miles long, and nearly the same broad; bounded on the N. by Merionethshire and Denbighshire, on the N.E. and E. by Shropshire, on the S. by Radnorshire, on the S.W. by Cardiganshire, and on the W by Merionethshire. It contains five market-towns, and 47 parishes, nearly 50,000 inhabitants, and sends two members to parliament. Though barren and mountainous in many parts, it has a greater mixture of fertile vale and plain than several of the Welsh counties. Its riches proceed from its sheep and wool, the hilly tracts being almost entirely sheep-walks; and the flocks, like those of Spain, are driven from distant parts to feed on them during the summer. This county also affords

mineral treasures, particularly lead; and it abounds with slate and lime; but there is no coal. Its principal rivers are the Severn, Vyrnew, and Tannat, which are remarkable for salmon.

MONTH, in chronology, one of the twelve parts into which a year is divided. In its proper acceptation, it is that space of time which the moon takes up in passing from any certain point to the same again, which is called a periodical month; or it is the space of time between two conjunctions of the moon with the sun, which is called a synodical month. That space of time which the sun takes up in passing through one sign, or twelfth part of the zodiac, is also called (but improperly) a month. So that there are two sorts of months; lunar, which are measured by the moon; and solar, which are measured by the sun. The lunar periodical month consists of 27 days, 7 hours, 43 minutes, 5 seconds: the lunar synodical month is 29 days, 12 hours, 44 minutes, 3 seconds, and 11 thirds. A solar month contains, upon a mean calculation, 30 days, 10 hours, 29 minutes, 5 seconds.

The Jews, Greeks, and Romans, made use of lunar synodical months; but, to avoid fractions, they consisted alternately of 29 or 30 days. The former the Romans called *cavi*, and the Greeks *χοιλοι*; the latter were termed *pleni* and *πληρεις*.

1. The Hebrew months were ranged differently in their sacred and in their civil year.

Order of the sacred year.

1	Nisan	Answering to our	March
2	Jiar		April
3	Sivan		May
4	Thammuz		June
5	Ab		July
6	Elul		August
7	Tisri		September
8	Marschevan		October
9	Casleu		November
10	Thebet		December
11	Sebat		January
12	Adar		February

Order of the civil year.

1	Tisri	Answering to our	September
2	Marschevan		October
3	Casleu		November
4	Thebet		December
5	Sebat		January
6	Adar		February
7	Nisan		March
8	Jiar		April
9	Sivan		May
10	Thammuz		June
11	Ab		July
12	Elul		August

These months, being lunar, cannot exactly answer to our solar months; but every Jewish month must be conceived to answer to two of ours, and partake of both. As these twelve lunar months consisted only of 354 days, the Jews, in order to bring it nearer to the true year, took care every three years to intercalate a thirteenth month into the number, which they called veadar, or the second adar. The new moon was always the beginning of the month; and it is said the Jews had people posted on elevated places, to give notice to the Sanhedrim as soon as she made her appearance. After this, proclamation was made by sound of trumpet, and "the feast of the new moon, the feast of the new moon," resounded amongst the people.

The ancient Hebrew months were of thirty days each, excepting the last, which consisted of thirty-five; so that the year contained 365 days, with an intercalary month at the end of 120 years, which, by absorbing the odd hours which remained at the conclusion of each year, brought it back nearly to its proper place. This regulation of the year was borrowed from the Egyptians.

2. The months of the Athenian year, as we have before observed, consisted alternately of twenty-nine or thirty days. The first month, according to Meton's reformation of the calendar, began with the first new moon after the summer solstice and was called hecatombæon, answering to the latter half of June, and the former half of July. The order of the months, with the number of days in each, are as follows:

1	Hecatombæon,	30
2	Metagilnion,	29
3	Boedromion,	30
4	Mæmacterion,	29
5	Panepsion,	30
6	Anthesterion,	29
7	Posideon,	30
8	Gamelion,	29
9	Elaphebolion,	30
10	Munichion,	29
11	Thargelion,	30
12	Scirrophorion,	29

Each month was divided into three decades of days, called *δεχημεραι*. The first was called *Μηνος αρχομενη* or *ισαμενη*, or the decade of the beginning of the month; the second was *Μηνος μεσουντος*, or the decade of the middle; and the third was *Μηνος φθινοντος*, *παυομενη* or *λεγοντος*, the decade of the expiring month.

The first day of the first decade was termed *Νεομηνια*, because the first month began with the new moon; the second day was *δευτερα ισαμενη*; the third *τριτη ισαμενη*, &c. The first day of the second decade was *πρωτη μεσουντος*, the second *δευτερα μεσουντος*, &c. The days of this decade were also called *πρωτη επι δεκα*, *δευτερα επι δεκα*, &c. The first day of the third decade was *πρωτη επ' εικαδι*; the second was *δευτερα επ' εικαδι*, &c. i. e. the first, second, &c. after twenty, because the last decade began on the twentieth day. This decade was also counted by inversion thus; *φθινοντος δεκατη* the twenty-first; *φθινοντος εννατη* the twenty-second; *φθινοντος ογδοη* the twenty-third; and so of the rest to the last day of the month, which was called *ενη και νεα*, the old and the new, because one part of that day belonged to the old and the other to the new moon; but after the time of Demetrius, the last day of the month was called from him *Δημητριας*; it sometimes was named *τριακας*.

The Grecian months, thus consisting of twenty-nine and thirty days alternately, fell short of the solar year 11 days 6 hours. To remedy this defect the cycle of four years, called *τετραετηρις*, was invented. In this cycle, after the first two years, they added an intercalated month, called *εμβολιμος*, consisting of twenty-two days; and again, after the expiration of two years more, they inserted another month of twenty-three days, the fourth part of a day having in the space of four years amounted to a whole year. See Year.

3. The Roman year under Romulus consisted of ten months only, and began with March, which contained thirty-one days; then followed April,

which had 30, May 31, June 30, Quintilis 31, Sextilis 30, September 30, October 31, November 30, December 30. These ten months containing no more than 304 days, this account was in a short time found to be deficient. Numa Pompilius, therefore, took away one day from each of these six months, April, June, Sextilis, September, November, December; and to the six days thus obtained he added fifty-one, which was the number that Romulus's year, in his opinion, wanted to make it perfect. Numa had now fifty-seven days to dispose of; he therefore divided them, and constituted two other months, January and February; the former consisting of twenty-nine, and the latter of twenty-eight days. The month of January, which he placed at the winter solstice, he made instead of March to begin the year. Thus Numa's year consisted of 355 days: but this being found 11 days 6 hours short of the solar year, he made use of the intercalation of ninety days at the expiration of eight years perpetually; which number, being made up of the eleven days and a quarter, kept the year pretty well to its place. The beginning of the year in Julius Cæsar's time had anticipated its true place 67 whole days: these he intercalated betwixt November and December; so that the year consisted, for this one time, of fifteen months or 445 days. This reformation was called the Julian correction, and this year the year of confusion. At the end of twelve years, by the ignorance of priests, who did not understand intercalation, twelve days had been intercalated for nine. This was observed by Augustus Cæsar, and rectified by ordering twelve years to pass without any intercalary days. The order and succession of months was the same as that of Numa. But January, March, May, Quintilis, Sextilis, October and December, had each 31 days; April, June, September 30, and February, in common years, 28; but every fourth year, or bissextile, 29. This, with a very little difference, is the account observed at present. Quintilis, in compliment to Julius Cæsar, was called July, because in this month he was born; and Sextilis, in honour of Augustus, was called August; both which names are still continued. See YEAR.

Each month by the Romans was divided into kalends, nones, and ides, all of which were reckoned backwards. The kalends were the first day of the month. The nones fell on the seventh, and the ides on the 15th, of March, May, July, October; but in all other months the nones were on fifth, and the ides on the 13th. For the more easy comprehension of the Roman manner of dating, according to this division of the months, here follows a table.

	March, May, July, October.	January, August, December.	April, June, September November.	February.
1	Kalendæ	Kalendæ	Kalendæ	Kalendæ
2	6	4	4	4
3	5	3	3	3
4	4	Prid. Non.	Prid. Non.	Prid. Non.
5	3	Nonæ	Nonæ	Nonæ
6	Prid. Non.	8	8	8
7	Nonæ	7	7	7
8	8	6	6	6
9	7	5	5	5
10	6	4	4	4
11	5	3	3	3
12	4	Prid. Idus	Prid. Idus	Prid. Idus
13	3	Idus	Idus	Idus
14	Prid. Idus.	19	18	16
15	Idus.	18	17	15
16	17	17	16	14
17	16	16	15	13
18	15	15	14	12
19	14	14	13	11
20	13	13	12	10
21	12	12	11	9
22	11	11	10	8
23	10	10	9	7
24	9	9	8	6
25	8	8	7	5
26	7	7	6	4
27	6	6	5	3
28	5	5	4	Prid. Kal.
29	4	4	3	
30	3	3	Prid. Kal.	
31	Prid. Kal.	Prid. Kal.		

N. B. Every leap year, February consisting of twenty-nine days, the 24th and 25th of that month are written sexto Kal. Mart.; hence leap year is called Bissextilis.

It is remarked by Camden, that "the old English, or Anglo-Saxons, could express most aptly all the conceptions of the mind in their own tongue, without borrowing from any:" of this, the names they gave to the months may be adduced as an example.

January. (Wulfe-Monat, Sax. i. e. Wolf-month.) Because in that month the wolves were *most mis-*

chievous to them, for that, through the extremity of cold and snow, they could not find beasts sufficient to satisfy their ravenous appetites.

February. (Sprout-Kele, Sax. i. e. Colewort, or Spring-wort.) Because then worts begin to sprout.

March. (Lenct-Monað, Sax. i. e. Lengthening-month.) Because then the days begin in length to exceed the nights.

April. (Oster-Monað, Sax.) Because their Easter generally fell in April.

May. (Tri-Milci, Sax. i. e. Three-milkings.) Because they then milked their cattle three times a day.

June. (Mede-Monað, Sax. i. e. Hay-month.) Because then they generally cut their hay.

August. (Arn-Monað, Sax. i. e. Barn-month.) Because they then filled their barns.

September. (Gerst-Monað, Sax. i. e. Grist-month.) Because then they carried their new corn to the mill.

October. (Wyn-Monað, Sax. i. e. Wine-month.) Because grapes were then usually pressed to make wines.

November. (Wynde-Monað, Sax. i. e. Windy-month.) Because of the high winds happening commonly in that month.

December. (Wynter-Monað, Sax. i.e. Winter-month.) Because of the cold then growing intense; and afterwards, (Haligh-Monað, Sax. i. e. Holy-month) on account of the nativity of Christ.

MONTH'S MIND. *s.* Longing desire. (*Shak.*).

MO'NTHLY. *a.* (from *month.*) 1. Continuing a month; performed in a month. (*Bent.*). 2. Happening every month. (*Dry.*).

MO'NTHLY. *ad.* Once in a month. (*Hook.*).

MONTIA. Water-chickweed. In botany, a genus of the class triandria; order trigynia. Calyx two-leaved; corol one-petalled, irregular; capsule one-celled, three-valved, three-seeded. One species only; common to the wet fields of our own country.

MONTI'NIA, in botany, a genus of the class dioecia, order tetrandria. Calyx four-toothed; petals four. Fem. style cloven; capsule oblong, two-celled; seeds numerous, flat. One species only; a Cape plant with shrubby angular stem; oblong-oval glabrous leaves; terminal, solitary flowers.

MONTMORENCI, a town of France, remarkable for the tombs of the ancient dukes of Montmorenci. It is seated on a hill, seven miles from St. Dennis, and ten from Paris.

MONTMORENCY (Anne de), constable of France, and one of the greatest generals of his age. He defended Menziers against Charles V. in 1512, and compelled the count of Nassau to raise the siege. He was taken prisoner with Francis I. at the battle of Pavia; and was mortally wounded in that of St. Dennis in 1567.

MONTMORENCY (Charles de), third son of the preceding, was made admiral of France by Henry IV. for his bravery. He died in 1612, aged 75. This illustrious house produced more great men than any family in France.

MONTMORILLON, a town of France, in the department of Vienne, seated on the Gartempe, over which is a bridge, 24 miles S. E. of Poitiers.

MONTOIR. *s.* (French.) In horsemanship, a stone as high as the stirrups, which riding-masters mount their horses from.

MONTPELLIER, one of the largest and most beautiful cities of France, in the department of Herault, with a citadel, a bishop's see, a university, in which is a celebrated school of medicine, and a late royal botanic garden, the first established in Europe. The cathedral was ruined by the Huguenots, but has been partly rebuilt. The number of inhabitants is computed at 32,000 The trade consists in silks, blankets, cotton goods, printed calicoes, gauzes, hides, cordials, perfumed waters, hair-powder, and verdigrise. The air is extremely healthy, and many invalids resort hither, from all parts, to recover their health. Montpellier is seated on a hill, five miles from the Mediterranean, near the Lez, a small navigable river, and on the rivulet Merdanson, which is conveyed into different parts of the city by subterraneous canals. It is 27 miles S.W. of Nismes, 47 N.E. of Narbonne, and 180 S. by W. of Paris. Lon. 3. 58 E. Lat. 43. 37 N.

MONTREAL, a fertile island of Canada, in the river St. Lawrence, 28 miles long and 10 broad. It was surrendered by the French to the English in 1760. It has a fortified town of the same name, built on the side of the river, whence there is a gradual easy ascent to what is called the Upper Town. It has suffered much by fires since it has been in the possession of the English. It is 110 miles N. of Albany, and 120 S. W. of Quebec. Lon. 71. 20 W. Lat. 45. 55 E.

MONTREAL, a town of Spain, in Arragon, with a castle, seated on the Xilcoa, 25 miles N.N.W. of Terruel, and 40 S. by E. of Calatajud. Lon. 1. 2 W. Lat. 40. 53 N.

MONTREAL, a town of Sicily, in Val di Mazara, with an archbishop's see; seated on a rivulet, five miles W. of Palermo, and 50 N.E. of Mazara. Lon. 13. 31 E. Lat. 38. 14 N.

MONTREAL, or MONTROYAL, a fortress of Germany, in the electorate of Treves, seated on the Moselle, 22 miles N.E. of Treves. Lon. 7. 6 E. Lat. 49. 59 E.

MONTREUIL, a strong town of France, in the department of the Straits of Calais, with a castle; seated on a hill, near the river Cauche, 10 miles N.W. of Hesdin, and 117 N. of Paris. Lon. 1. 52 E. Lat. 50. 27 N.

MONTREUIL-BELLAY, a town of France, in the department of Maine and Loire, seated on the Touet, 12 miles S.S.W. of Saumur, and 155 S.W. of Paris. Lon. 0. 9 W. Lat. 47. 6 N.

MONTRICHARD, a town of France, in the department of Loit and Cher, and late province of Blasois, with a castle. It is seated near the Cher, 12 miles S.E. of Amboise, and 112 S.W. of Paris. Lon. 1. 22 E. Lat. 47. 22 N.

MONTROSE, a handsome town of North Britain, in the shire of Angus, situated at the mouth of the river Esk, on the German ocean,

46 miles N.E. of Edinburgh, but 70 miles distance by road. The houses are neat, and many of them in the modern taste. The most remarkable public buildings are, the town house, the church, and an elegant episcopal chapel.—Montrose is a parliament town, and a dukedom in the family of Graham. It stands between two rivers, the south and north Esks, over which there have been lately built two very handsome bridges, at a great expence. The salmon fisheries on these rivers are very valuable, and form a good branch of commerce. The harbour is a fine semicircular bason, defended by a handsome stone pier. A great number of trading vessels belong to this port. The inhabitants of Montrose are about 8000.

MONTSAUJEON, a town of France, in the department of Upper Marne, 15 miles S.S.W. of Langres, and 145 S.E. of Paris. Lon. 5. 16 E. Lat. 47. 36 N.

MONTSERRAT, a mountain of Spain, in Catalonia, on which is a famous monastery and chapel, dedicated to the Virgin, resorted to by numbers of pilgrims. It is inhabited by monks of several nations, who entertain all that come out of devotion or curiosity, for three days, gratis. This mountain is said to be 10 miles in circumference, and 3300 feet above the level of the sea, towering over a hilly country, like a pile of grotto work, or Gothic spires. It is 25 miles N.W. of Barcelona.

MONTSERRAT, one of the Leeward Caribbee Islands, discovered in 1493 by Columbus, and so named by him from its resemblance to the mountain mentioned in the preceding article. It is about nine miles in length and breadth; and the hills are covered with cedar and other trees. It belongs to the English, and is 30 miles S.W. of Antigua. Lon. 62. 34 W. Lat. 16. 54 N.

MONT ST. MICHEL, a strong town of France, in the department of the Channel, built on a rock in the sea, which is ascended at low water. Its late Benedictine abbey served at once for a castle of defence, and a state prison, and was also much frequented by pilgrims. The prior of the abbey was governor of the town, and the keys were brought to him every evening. This place gave name to the late military order of St. Michel, founded by Louis XI. in 1479. It is 10 miles S.W. of Avranches, and 180 W. of Paris. Lon. 1. 30 W. Lat. 48. 37 N.

MONTUCLA (John Stephen), a celebrated mathematician, was born at Lyons, September 5, 1725. His father was a banker, and he was intended for the same profession; but the science of calculations to which he was introduced, soon indicated the natural bent of his mind. He was instructed in the ancient languages, and in the rudiments of mathematics, in the Jesuit's college at Lyons: and by his own private exertions obtained a competent acquaintance with the Italian, German, Dutch, and English languages; the latter of which he not only read, but also spoke very correctly. Having finished his studies at Lyons, he went about his twentieth year to Toulouse to study the law; a branch of knowledge then deemed essential in the liberal education of every person not destined for the profession of arms. From Toulouse he repaired to Paris, where he soon became acquainted with Diderot, Dalembert, Lalande, Blondel, Cochin, Leblond, Lagrange, &c. the society of whom riveted his choice for mathematics and natural philosophy. It was in relaxing and unbending his mind from his severer studies, that he in a manner made an entire new book of Ozanam's Mathematical Recreations; a work, which, with Montucla's improvements, has been translated into the English language by Dr. Hutton. Many other pieces were in an anonymous manner published by Montucla: among which we cannot omit mentioning an ingenious and learned History of Researches relating to the Quadrature of the Circle, published in 1754; a work very interesting on account of the number of speculators who have gone astray after that seducing phantom, and of the curious properties to which those researches have given rise.

Montucla and Condamine introduced into France, in 1756, the practice of inoculation for the small-pox, which had been brought into England in 1721, by lady Mary Wortley Montague, on her return from Constantinople. Montucla made a translation from the English of the principal writings on that subject, which he added to a memoir of Condamine.

In the year 1758 came out Montucla's grand work, the History of Mathematics, in two large quarto volumes: a work of profound erudition, and upon which, young as he was, he had spent many years. This performance of immense labour and knowledge, published at thirty-three years of age, justly procured the author a most distinguished place in the learned and scientific world. This history, so truly admirable, whether we consider the extreme clearness and precision with which the subjects are treated, or the profound learning it exhibits, having been long out of print, the author's employment under the old French government, as first commissary of the king's buildings, for many years prevented his fully yielding to the solicitations of his friends, to continue the work through the eighteenth century, in a new and enlarged edition. But the loss of his fortune and employment by the revolution in France left him but too much leisure for that purpose. The consequence, happy in this instance for the abstruse sciences, has been a new edition, in four large quarto volumes; in which the history is continued down to the end of the eighteenth century; and the former parts also very much enlarged and improved. This new edition, however, was not published till after the death of Montucla; and then under the superintendance of Lalande, who obtained some valuable additions from Lacroix and others.

In 1755 Montucla was elected an associate member of the academy of sciences at Berlin.

And in 1761 he was placed at Grenoble as secretary to the office of intendance; where he married Maria Françoise Romand, who survived him.

The duke de Choiseul having ordered, in 1764, a colony to be formed at Cayenne, Montucla went out there as secretary to the commission and astronomer royal. The affairs of the colony not proving successful, after fifteen months, Montucla returned again to Grenoble, bringing with him many useful observations and specimens in botany and natural history. This voyage also furnished him with those curious observations on the luminousness of the sea in many places, and of those luminous insects, which he inserted in the fourth volume of the later editions of his Recreations.

Soon after his return, Montucla was appointed at Versailles to the honourable and profitable office of first commissioner of the royal and public buildings; an employment which he executed with great ability and usefulness during more than twenty-five years, till the overthrow of the monarchy put an end at once to his office, and the little fortune his regularity and economy had enabled him to save; throwing him again on the world, in his old age, naked and stript of every thing except his talents, his integrity, and the respect and esteem of his friends.

Montucla's modesty and uprightness were not less remarkable than his erudition. He was offered a place in the Paris academy of sciences; which through delicacy he refused, as he felt that he should not have leisure sufficient properly to attend to the duties of it. Montucla was named a member of the National Institute from the time of its commencement: and the government of 1795 employed him in examining and analyzing the treatises deposited in the national archives. He was named professor of mathematics in the central school at Paris; but his bad state of health compelled him to decline the office: the department therefore honoured him with a place in the jury of central instruction. But a place in the national lottery office was the only resource for his family during two years. A pension of 2400 francs (100*l.*) was given him by the minister Neufchateau on the death of Saussure; but this he enjoyed only four months previous to his death, which happened December 18, 1799; and was chiefly occasioned, as often happens to literary and sedentary men, by a retention of urine. He left, besides his widow, a daughter married in 1783, and a son employed in the office of the minister for the interior.

Montucla was one of the most considerable mathematicians of the eighteenth century; being well acquainted with all the branches of the abstruse sciences. His taste, however, always pure and clear, and not at all vitiated by any fondness for ostentatious display, led him to prefer the pure and luminous methods of the ancient mathematicians; and to blame, in the French and the Germans, the great neglect of the same principles, which they evinced on all occasions by their uniform preference of the mere modern analysis. As a historian his principal characteristic was candour: he has been accused of giving way to national prejudices; but in this respect his conduct is infinitely less culpable than a subsequent historian in the same department—Bossut. Montucla translated in some of his days of leisure Carver's Travels in North America.

In the qualities of his heart Montucla was truly estimable: remarkably modest in his deportment; benevolent far beyond the means of his small fortune; breathing in all his conduct the delicacy of a fine taste, and the sweetness of virtue.

MONUMENT. *s.* (*monument*, French.) 1. Any thing by which the memory of persons or things is preserved; a memorial (*Raleigh*). 2. A tomb; a cenotaph (*Pope*).

MONUMENTAL. *a.* (from *monument.*) 1. Memorial; preserving memory (*Pope*). 2. Raised in honour of the dead; belonging to a tomb (*Crashaw*).

MONYCHUS, in fabulous history, a powerful giant, who could root up trees, and hurl them like a javelin. He receives his name from his horse's feet, as the word implies.

MONZA, a town of Italy, in the Milanese, seated on the Lambro, eight miles N.E. of Milan. Lon. 9. 20 E. Lat. 45. 33 N.

MONTZINGEN, a town of Germany, in the circle of Upper Rhine, 12 miles W. of Creutznach, and 42 E. of Treves. Lon. 7. 14 E. Lat. 49. 50 N.

MOOD. *s.* (*modus*, Latin.) 1. The form of an argument. (See MODE). 2. Style of music (*Milton*). 3. The change the verb undergoes in some languages, to signify various intentions of the mind, is called *mood*. (See GRAMMAR). 4. (from *mod*, Gothic; moð, Sax.) Temper of mind; state of mind as affected by any passion; disposition (*Addison*). 5. Anger; rage; heat of mind (*Hooker*).

MOODY. *a.* (from *mood.*) 1. Angry; out of humour (*Shakspeare*). 2. Mental; intellectual (*Shakspeare*).

MOON, (*Luna*, ☽) in astronomy, one of the heavenly bodies, usually ranked among the planets; but with more propriety accounted a satellite, or secondary planet. Among the ancients, the moon was an object of prime regard. By the Hebrews she was more regarded than the sun, and they were more inclined to worship her as a deity. The new moons, or first days of every month, were kept as festivals among them, which were celebrated with sound of trumpets, entertainments, and sacrifice. (See Numb. xxviii. 11. x. 16. 1 Sam. xx. 5—18.) People were not obliged on these days to rest. The feasts of new moons were a miniature representation of the feast of trumpets, which was held on the first of the month Tisri, which was the beginning of the civil year. The Jews, not being acquainted with the physical cause of eclipses, looked upon them, whether of sun or moon, as signs of the divine displeasure. The Grecians looked upon the moon as favourable to marriage; and the full moons, or the times of conjunction of sun and moon, were held the most lucky seasons for celebrating marriages; because

they imagined the moon to have great influence over generation. The full moon was held favourable for any undertakings by the Spartans, and no motive could induce them to enter upon an expedition, march an army, or attack an enemy, till the full of the moon. The moon was supposed both by Greeks and Romans to preside over childbirth. The patricians at Rome wore a crescent on their shoes, to distinguish them from the other orders of men. This crescent was called *Lunula*. Some say it was of ivory, others that it was worked upon the shoe and others, that it was only a particular kind of fibula, or buckle.

As all the other planets move primarily round the sun, so does the moon round the earth: her orbit is an ellipsis, in which she is retained by the force of gravity; performing her revolution round the earth, from change to change, in 29 days 12 hours and 44 minutes, and round the sun with it every year: she goes round her orbit in 27 days 7 hours 43 minutes, moving about 2290 miles every hour; and turns round her axis exactly in the time that she goes round the earth, which is the reason of her keeping always the same side toward us; and that her day and night taken together are as long as our lunar month.

The mean distance of the moon from the earth is $60\frac{1}{2}$ semi-diameters of the earth; which is equivalent to 240,000 miles. The mean eccentricity of her orbit is $\frac{55}{1000}$ of her mean distance, or in miles 13000, which makes a considerable variation in that mean distance. Her diameter is to that of the earth as 100 to 365, as 11 to 40.15, or 2180 miles; its mean apparent diameter is 31 minutes $16\frac{1}{2}$, and that of the sun 32 minutes 12 seconds. Its mean diameter, as seen from the sun, is six seconds.

The moon's surface contains 14,898,750 square miles, and its solidity 5,408,246,000 cubical ones. The density of the moon's body is to that of the earth as 48,911 to 29,214; to that of the sun, as 48,911 to 10,000; its quantity of matter to that of the earth, nearly as 1 to 39.15; the force of gravity on its surface is to that on the surface of the earth as 139 2 to 407.8; and the moon's bulk to that of the earth as $\frac{1}{49}$ to 1. The moon has scarce any difference of seasons; because her axis is almost perpendicular to the ecliptic.

The different appearances of the moon are very numerous: sometimes she is increasing, then waning; sometimes horned, then semicircular; sometimes gibbous, then full and round. Sometimes, again, she illumines us the whole night, sometimes only a part of it; sometimes she is found in the southern hemisphere, sometimes in the northern: all which variations having been first observed by Endymion, an ancient Grecian who watched her motions, she was fabled to have fallen in love with him. The source of most of these appearances is, that the moon is a dark, opaque, and spherical body, and only shines with the light she receives from the sun; whence only that half turned towards him at any instant can be illuminated, the opposite half remaining in its native darkness. The face of the moon, visible on our earth, is that part of her body turned towards the earth; whence, according to the various positions of the moon, with regard to the sun and earth, we observe different degrees of illumination; sometimes a large and sometimes a less portion of the enlightened surface being visible.

The motions of the moon are most of them irregular, and very considerably so. The only equable motion she has, is her revolution on her own axis, in the space of a month, or time in which she moves round the earth; which is the reason that she always turns the same face towards us.

This exposure of the same face is not so uniformly so, however, but that she turns sometimes a little more of the one side, and sometimes of the other, called the moon's libration; and also shews sometimes a little more towards one pole, and sometimes towards the other, by a motion like a kind of wavering, or vacillation. The former of these motions happens from this: the moon's rotation on her axis is equable or uniform; while her motion in her orbit is unequal, being quickest when the moon is in her perigee, and slowest when in the apogee, like all other planetary motions; which causes that sometimes more of one side is turned to the earth, and sometimes of the other. And the other irregularity arises from this: that the axis of the moon is not perpendicular, but a little inclined to the plane of her orbit: and as this axis maintains its parallelism in the moon's motion round the earth, it must necessarily change its situation in respect of an observer on the earth; whence it happens, that sometimes the one, and sometimes the other pole of the moon becomes visible.

The very orbit of the moon is changeable, and does not always persevere in the same figure: for though her orbit be elliptical, or nearly so, having the earth in one focus, the excentricity of the ellipse is varied, being sometimes increased, and sometimes diminished; viz. being greatest when the line of the apses coincides with that of the syzygies, and least, when these lines are at right angles to each other.

Nor is the apogee of the moon without an irregularity; being found to move forward, when it coincides with the line of the syzygies; and backward, when it cuts that line at right angles. Neither is this progress or regress uniform; for in the conjunction or opposition, it goes briskly forward; and in the quadratures, it either moves slowly forward, stands still, or goes backward.

The motion of the nodes is also variable; being quicker and slower in different positions.

The physical cause of the moon's motion about the earth is the same as that of all the primary planets about the sun, and of the satellites about their primaries, viz. the mutual attraction between the earth and moon. See ASTRONOMY. See also Newton's Principia, Vince's Astronomy, 4to., and Laplace's Mecanique Celeste.

New observations on the atmosphere, twilight, &c. of the moon.—M. Schroeter of the Royal Society of Gottingen has lately published a very curious and elaborate work in German, entitled, Selenotographische Fragmente, &c. or Selenotopographical Fragments, intended to promote a more accurate knowledge of the moon's surface. The several maps of the moon, which have been delineated by Hevelius, Ricciolus, Cassini, and Mayer, are well known to every person conversant with astronomical subjects. See ASTRONOMY. These, however, are very defective. M. Schroeter has, therefore, devoted many years to this part of astronomy; and in the work of which we shall here present our readers with an abridged account, he has aimed at giving his own observations with such clearness and accuracy that they may be verified by less skilful astronomers than himself; he has set down the exact time and epoch of each observation, and minutely described every accessary circumstance of the moment, such as the

libration of the moon, the precise limits of her luminous rays, and her diameter, together with the magnifying power of the astronomical instrument employed.

It must be confessed that the means within his reach were of the most ample kind: his thirteen and twenty-seven feet reflectors magnified two and three thousand times and even more; but finding that he gained in point of clearness in the image in most of his observations when he used eye-glasses of less power, he preferred an eye-glass which magnified 130 times for his thirteen feet telescope, and an eye-glass of 180 for his seven and twenty feet instrument.

In order to give an idea of the first three sections, which contain in twenty-eight chapters a very precise description of some particular regions of the moon, we shall present our readers with the following analysis.

The author informs us, that in order to examine the surface of the moon with advantage, he confined his enquiries to very small portions of the planet at a time which were illuminated under a very small angle of light. In this way he frequently discovered incomparably more with glasses of small power than with the most powerful instruments, when taking observations under much larger angles of illumination, i. e. when the rays of the sun arrive under a greater altitude at any given point in the moon.

It may sometimes happen that one astronomer does not see objects in the same light as another, although their instruments and the other circumstances were precisely similar: this does not always arise from the effects of the different angles of illumination under which the object is discovered, and the very different reflections which frequently result; but may also be ascribed to the accidental variations of the atmosphere of the moon, which are very frequent, or to other causes which must be investigated by actual observations of the planet itself. It has also more than once happened that M. Schroeter himself saw objects quite differently at one time and at another, and sometimes even he lost sight of them altogether, although he employed instruments of the greatest magnifying power. He cites as an example of this anomaly, an observation upon the spot of Gassendi, which he has represented by two drawings of different dates. He remarks a great number of these accidental variations observed at various points in the moon's disk, and takes occasion to offer some conjectures, which are perhaps worthy of being repeated.

On the 1st November, 1791, for instance, he saw the crater which forms the centre of Possidonius under the appearance of a tolerably uniform circular plain of a greyish colour, without any darker shade, while the seven craters surrounding it were very deeply shaded. Next day in the evening the same object, seen with the same telescope, shewed itself as a profound crater, with obscure shades, although, if it could have been judged by the direction of the solar rays upon this part of the moon, the shadows ought to have appeared longer and stronger that evening than the day before. Nothing but an accidental cause could have altered the apparent form of the crater in twenty-four hours, whether we attribute this accident to a change in the atmosphere of the moon, or to a fermentation in its interior, or to the actions of some animated beings who inhabit it.

In this same region of Possidonius, M. Schroeter saw with the greatest precision on the 4th of June, 1794, in a clear and calm day, five new objects: whether these were new craters, or chains of mountains which he had not seen before, he never observed them since.

On the other hand, he could not recognise with the twenty-seven feet telescope the crater which he had previously and repeatedly observed with the seven feet telescope; this he attributes to a variation in the atmosphere of the moon. He also observed with a thirteen feet reflector a new production, which unexpectedly appeared in a very distinct manner, in a crater, on the 6th of February, 1797, although in the course of nine years of anterior observations made with the best instruments, he had never discovered the least trace of such a phenomenon. This new production had in all probability made its appearance between the 12th of October, 1796, and the 6th of February, 1797. Subsequent to this last period, it had generally been visible under very different, and sometimes unfavourable angles of illumination; and yet other variable appearances were exhibited, particularly subsequent to the 4th of July, 1797, at which period this new crater was confounded in a mass of atmospheric fermentation, and perhaps new eruptions ensued.

In order to render more sensible the different forms under which the various objects in the moon may present themselves to the astronomical observer, and according to the accidental variations of the atmosphere of this planet, the author represents the landscape around Lilienthal, the place of his residence, as seen from the moon in the month of July, when the inhabitants of these environs burn the wrack off their fields, and when a thick smoke is spread over the ground. An observer placed in the moon at this period would see a grey envelop extended over that part of the north of Germany, an appearance which would not take place under any other circumstances. M. Schroeter is of opinion, that the crater of Possidonius, as already mentioned, having appeared grey on the 1st of November, and of an obscure black next day, may be ascribed to similar circumstances. In this former volume he had spoken of a great number of luminous points in the obscure hemisphere of the moon, subject to variations which had not for their only cause the differences in the reflection of the light of the earth. All these facts have now been confirmed by the help of great reflectors, and particularly in the luminous spots Aristarchus, Manilius, and Menelaus, in which the author has found at certain times distinct objects, and at others has not been able to discover even the objects themselves. The following luminous appearances appear to be somewhat remarkable: on the 2d of April, 1794, at eight o'clock in the evening, the obscure part of the disk being very distinctly visible, M. Schroeter discovered near the western boundaries of the sea of vapours (*mare vaporum*), in opposition to the dull light of the other parts, a luminous point extremely brilliant, which equalled a fixed star in lustre, and which the author had never perceived at that particular spot. It was evident, at the first glance, that this light could not have been reflected from the earth, and, in fact, in half an hour or less this brilliant point vanished so completely that it could no longer be recognized, and the author frequently afterwards conjectured that it no longer existed in the same place, but a similar point shewed itself towards the west. The kind of meteor which thus vanished is an appendage to the phenomenon observed long before in the

spot of Plato in the Alps of the moon, when upon the 26th of September, 1788, M. Schroeter feebly discerned a similar luminous point, and found that it began to be less and less discernible until it disappeared, nor did he see it again for twelve years. This former phenomenon in the Alps of the moon may have been the effect of a very active effort of nature, and the new phenomenon which happened in the milder temperature of the sea of vapours may rather be considered as the effect of a voluntary or involuntary action of the inhabitants of the moon. An illumination at London; a city on fire; the flashes of gunpowder from a besieged fortress, seen from the moon with M. Schroeter's reflectors, would present a spectacle similar to these luminous evanescent appearances seen from the earth upon the surface of its satellite. The Sea of the Crisis, in particular, which is one of the most remarkable places upon the surface of the moon, is thickly strewed with luminous points, which seem to belong to a plain abounding in asperities, natural or artificial.

Besides several high mountains, the exact measurements of which are here given, the author has discovered in several places of the moon, for instance in Possidonius, small elevations which are nearly fifty feet in height, and even less; an innumerable quantity of similar asperities is also to be found at a small distance from Marius. These eminences are not constantly visible, and their form is variable.

In the sea of vapours near Plato, and in other places, M. Schroeter discovered deep furrows, or a kind of long narrow valley resembling a canal. This phenomenon extends for seventy geographic miles into the sea of vapours. We are acquainted with no sublunary valley of so great a length. It is somewhat singular that this valley stretches over inequalities of mountains and craters in such a manner, that the upper ridge of these eminences is intersected by the furrow or valley in question. Can this be a production of nature, or of the free agency of animated beings? Such is the question put by M. Schroeter to his readers; and his observations seem to place it beyond a doubt that the moon has not at its surface any fluid so dense as the water of our earth; and he has also apparently demonstrated that his favourite planet has no considerable rivers, nor natural basins which serve to contain water, as in this sublunary world; but it does not follow from all this that the moon is a chalky body entirely dry; these long vallies or canals may perhaps contain rivers which have the same relative density to the subtle atmosphere of the moon, that is observed between water and our terrestrial atmosphere. Thus, in a certain sense, we may say that the moon has its rivers Plata and Amazon. Throughout these lunar Alps, (a chain of mountains equally continuous with those of Europe) we find the valley or furrow above mentioned stretching like a narrow pass, as if a violent convulsion of nature had cleft the mountains in a straight line.

In the fourth section, which contains observations upon the structure of the moon, the first chapter treats of the eminences and depression of that planet, and of its craters and vallies in general. The highest mountains, as the author had formerly estimated, are five times higher than the mountains of our globe, keeping in view the relative diameters of the two planets. The highest mountains of Venus and Mercury are, with respect to the mountains in the moon, nearly in the proportion of the relative diameters of these planets. The greatest height, according to the former observations of M. Schroeter, was to be met with in some peaks of the chains of mountains known by the name of Leibnitz and Dorfelsh, towards the south pole of the moon; and in the eastern parts of the southern hemisphere, in the mountains D'Alembert and De Rook. The height of the latter is from 24 to 25,000 feet, and none so high have been as yet observed in the northern hemisphere. The eclipses of the sun afford opportunities of observing directly the vertical altitudes of the mountains of the moon which are exhibited upon its obscure edge. An observation in these circumstances succeeded with the author at the time of the great eclipse of the sun, September, 1793. Immediately after its commencement he observed some summits of mountains projecting from the edge of the moon's disk, which, in their vertical height alone, and in the extent to which they were seen (for the lower extremities were lost in obscurity), must have been 3,000 geographical miles high. During this remarkable eclipse, Herschel also discovered two summits of mountains which were projected upon the edge of the sun. The spherical form of the moon projected upon this edge was remarked by M. Schroeter and by all his pupils with the utmost precision; at the distance of one minute from the limb, what was observable of this spherical form gradually disappeared: a phenomenon which M. Schroeter endeavours to account for in another place by remarking, that the light of the earth was considerably increased by the solar penumbra, and by the crepusculum.

The depth of some craters of certain hollows, which are not circular, extends, according to the author, to the depth of three quarters of a mile. A short distance from the high mountain Rook, we find a hollow called Christopher Milius, the vertical depth of which is at least 15 or 16,000 feet. The Chimboraco of our globe might be wholly swallowed up in this cavity. Craters in general are formed by eruptions from the interior; they are empty basins, from which the mass that surrounds them in the form of a ring has been vomited; but in the moon there are cavities of another kind, such as those of Milius and others already named, presenting irregularities of a circular form in the edges of the moon, between the interstices of which we can see the clear sky; there are some parts in the moon which are sunk by some powers of nature, vallies hollowed out, not merely upon the surface of that planet, but dug as it were into its mass: i. e. greatly below its mean surface. The fixed stars we perceive in the vicinity of these hollows of the moon may for this reason appear sooner or later by a few seconds in their emersions or immersions, than when they exist opposite those portions of the edge which are not irregular. The author, by referring to these sinuosities, ingeniously accounts for the pretended hole, which in the total eclipse of the sun on the 14th of June, 1778, was observed by admiral Ulloa. There could not possibly have been a volcano in the moon at that period, for it would have thrown out so glaring a light, that the luminous point must necessarily have been perceived in the black glass of the telescope upon the moon's disk. But the sun, when seen through a similar fissure, must have appeared as if seen through a hole, in the event of the direction of the fissure being oblique to that of the luminous ray. M. Schroeter, therefore, upon remarking that this fissure exists in the lunar region where the observation of Ulloa was

made, and that it exists in that place alone, gave it the name of the above admiral. M. Schroeter proceeds to draw the following inferences.

"The greatest eminences of 25,000 feet and upwards, and the deepest hollows of three quarters of a geographical mile in depth, are situated in the southern part of the moon; hence we may conclude from actual observations, that in the moon, as upon the earth, and in the planets Venus and Mercury, the southern hemisphere is generally the most unequal and irregular.

"As the gravitation at the surface of the moon is only, according to theory, about one-fifth of that which takes place on the earth, we may say that, with regard to the relative diameters of the two planets, the mountains of the moon are five times higher than those of the earth, as has been already remarked.

"In our globe earthquakes are extremely rare, and still more rarely do they produce complete eruptions, such as islands or new mountains: the solid mass of the earth opposing too much resistance to these formations. It is otherwise with the moon, where the gravity is five times less, and where explosive effects always meet with less opposition; thence it follows, that the whole surface of the moon is almost always in a state of revolution; explosions, earthquakes, and other convulsions, follow each other in dreadful successions. New objects appear and vanish almost while the astronomer has his eye at his telescope. Hence proceeds that innumerable heap of craters, the second formation encroaching upon the first, the third effacing the two former, while at each eruption the preceding one is overwhelmed even before it has attained its destination."

Our readers will at once perceive the total discrepancy between this terrific description of the revolutions of the lunar world, and the fantastic idea attempted to be inculcated by M. Schroeter that there are animated beings, with houses, palaces, cathedrals, and tea-kettles, in the moon, as well as upon our planet. All these creatures of our astronomer's imagination must indeed be *sui generis*.

The fourth chapter of the second section is filled with enquiries into the atmosphere of the moon, its morning and evening crepusculum, the height and density of the air in that planet, &c. The author in his former volume had placed beyond a doubt the existence of an atmosphere which had been denied to that planet; he had mentioned a number of appearances in which some objects, in other respects identical, had appeared sometimes under one form, and at other times under another; while sometimes they were not visible at all: he had proved that this atmosphere of the moon, although much more subtle and transparent than ours, had the power of weakening, in a remarkable manner, the light of the sun descending under the lunar horizon; at which period, the summits of some mountains, being in this light on the obscure side of the moon, visibly threw out a lustre so much the more brilliant, as they were more distant from the edge of illumination, i. e. projected farther forward into the obscure part of the disk. All this, however, only gave rise to a conjecture as to a real refraction of the rays of light, whence there resulted a crepusculum upon the moon; but M. Schroeter has now converted this conjecture into a certainty by the observations contained in the present work. He has demonstrated not only that there is a crepusculum in the moon, but that we may measure the extent of it, as well as the thickness and density of the layers of the fluid which occasion it. The first complete observations were made by M. Schroeter upon this subject on the 24th of February, 1792, in the twilight of that night; the moon being then two days and a half old. With a Herschel telescope of seven feet, and magnifying seventy-four times only, he discovered in the obscure part of the moon some places illuminated with a dull greyish light, very near to other obscure parts which did not become visible until some time afterwards; a heavy and evidently crepuscular lustre enlightened the confines of the obscure edge of the planet, stretching into the points of its two horns, and this lustre spread out in the form of a pyramid, the summit of which was insensibly confounded with the light sent from the earth into the obscure part of the moon. The projection of this shining part was then 1′ 10″ in length, and 2″ in breadth.

He then concludes that this crepusculum of the moon can be better observed two or three days before and after the new moon, and in spring and autumn during the short crepuscula of the earth, and the greatest height of the moon in the horizon. Our author, therefore, fixed upon the moment of the smallest elongations of the moon, twenty-eight hours and a half after its being renewed, with a twenty-seven feet reflector. Hevelius had not been able to observe the moon until at least forty hours after the conjunction. By a geometrical process M. Schroeter estimated the extent of the lunar crepusculum, according to the distance comprehended between the limits of this crepusculum and the point of the horns, and he found by several observations that it extends over an arc of 2½ degrees of the moon's circumference. Or rather, taking the medium of twenty-two observations made during eight years, he estimates this extent more exactly at 2° 38′ 56″, but it sometimes amounted to 3° 6′ 44″. Several favourable circumstances must combine in order to observe this appearance. The author has sometimes perceived it merely in the prolongation of one of the two horns; at other times it was invisible, because apparently there were mountains which intercepted the light.

There remained a doubt whether this crepuscular light was or was not a consequence of the penumbra, or perhaps the effect of the immediate reflection of the solar rays, by means of some greyish plains in the moon. The author endeavours to resolve this doubt in a manner which sets at defiance the possibility of any illusion. Upon the whole, it is proper to say of this chapter upon the lunar atmosphere, that it contains the result of many years fatiguing observations, which will hand down the name of M. Schroeter as an honour to the age in which he lived.

If we adopt, in the calculation of these observations, the same principles by which La Hire has determined the height of our terrestrial atmosphere, by extending to 38,000 feet the height at which the atmosphere ceases to reflect the light in a sensible manner, or to 34,500, if the limit of refraction is in question, we find that the analogous limit in the atmosphere of the moon rises only 1,404 feet, according to the maximum of extent observed by M. Schroeter, namely, 3° 6′ 44″. But this height is solely that of the lunar crepusculum visible to us. The author estimates at 78 feet, the height of the strata of the lunar air which may occasion a crepusculum upon the same planet. From these data the author has theoretically

required what ought to be the relative density of the atmosphere of the earth and of the moon, and he has found that the atmosphere of the latter ought to be twenty-nine times less dense than ours, and at the moment when the work was put to press, Dr. Melanderhielm, of Stockholm, wrote to M. Schroeter that he had ascertained that the density of the atmosphere of two planets should in general be as the square of the power of gravitation at their surface; now according to Newton, the gravity at the surface of the moon is to the same power upon the earth as 2,83 : 15,10, or as 1 to 5,33. According to this theorem, the density of the air of the moon should therefore be as the square of 5,33, or 28,40 times less than that of the air of the earth; this differs very little from the result incontestably found by M. Schroeter after a most fatiguing and intricate train of experiments.

According to the same principles, we ought to find the refraction at the surface of the moon to be 28 or 29 times less than at the surface of the earth.

M. Schroeter applies his discoveries upon the lunar atmosphere to the occultations of stars by this satellite. As the height of the inferior strata of the air, which can still break the rays of light in a manner sensible to us, does not exceed 648 yards, a quantity which viewed from the earth, only passes from the edge of the moon 0″ 36 of a second, the weakening of the light of a fixed star entering into this atmosphere could not, if it were sensible, be perceived except during a quarter of a second, the time which the moon takes to travel $\frac{25}{100}$ of a second of a degree in her orbit. Now the lustre of stars of the first, second, and third magnitude, is too strong to admit of our observing any diminution for so short a period. If it be a planet which undergoes the occultation, its diminution of light on arriving at the disk may proceed from the graduated occultation of its apparent diameter. This system agrees with twenty occultations described in detail by the author.

The most brilliant fixed stars, and the planets, exhibit no diminution of light in this case; it is only remarked from time to time in the minute stars, not visible to the naked eye, and those last only undergo this obscuring of their light, when by chance they come out or enter opposite to the summit of a mountain of mean altitude, when the air of the moon, less dense, cannot any longer cause any sensible refraction of the rays coming from the star. There may be exceptions when the star which enters corresponds to the declivity of a very high mountain; and entering also obliquely, it seems to lose its light gradually; a diminution which, according to the author's observations, in a certain case (the only one of the kind), may be remarked during seven or eight seconds. On this occasion, which furnishes a kind of micrometrical measurement applicable to the fixed stars, the author found their diameter very small. The diameter of Aldebaran, according to the time employed in its immersion upon the edge of the moon, appeared to him to be between $\frac{1}{5}$ and $\frac{1}{4}$ of a second; the diameter of the star 30, and the Pisces 33, appeared to be more than $\frac{1}{5}$ of a second. The other fixed stars suddenly disappeared, without the phenomenon having any sensible duration.

In the third chapter of the fourth section, M. Schroeter gives a kind of recapitulation. To this chapter an engraving is attached, which exhibits in a distinct manner the relation of the vertical height of the densest atmosphere of the moon, with the height of the mountains of that planet, which have been measured, and with the depth of the craters, and other cavities or hollows. In the first figure of this plate are represented the lowest chains of mountains, 16 or 18 yards high; on the second, the mountains with circular edges containing a plain or a crater; in the third, the higher mountains placed above some mountains with circular edges; in the fourth, the central mountains or those which are seen in the midst of craters of mountains, with circular edges; in the fifth, the other isolated mountains from 50 to 25,000 feet of vertical height, the craters and other cavities of the moon, from 602 to 50,80 yards in depth. All these particulars are represented upon the same scale on which 200 yards correspond to a decimal line. The same table contains comparisons between the highest mountains of the moon, and those of the earth, Venus, and Mercury; with the references between the altitudes of the crepuscular strata of the moon, the earth, and Venus. We see at a single glance, according to this table, that the craters and the fissures of the edges are for the most part proportionally deeper, according as the atmosphere is higher, and that consequently the air of the moon must attain a certain maximum of density in their interior; moreover that the accidental variations of the atmosphere cannot take place, except in the region of the lower mountains of the moon, and not at the summits of the high chains; these last being far above the densest strata. In fact, the author has most frequently observed these accidental variations in the lower regions; as, for instance, in the sea of the Crises, in Cleomedes Possidonius, Gassendi, &c. In this atmospherical constitution of trifling density, we ought not to be astonished if there be continually developed so many fermentable matters from the interior of the moon, and if we see no atmospherical productions like our clouds, and none of those regular easterly or westerly winds which we find upon our own earth, and upon Venus, Mars, and perhaps Saturn. The atmosphere of the moon seems in general to be too subtile for the existence of any winds which can be properly so called. Slight atmospherical vapours alone always cover some low and contracted plains, and in all cases those which constitute the inferior level of the moon.

Of the harvest-moon.—It is remarkable that the moon, during the week in which she is full about the time of harvest, rises sooner after sun-setting than she does in any other full-moon week in the year. By this means she affords an immediate supply of light after sun-set, which is very beneficial for the harvest and gathering in the fruits of the earth: and hence this full moon is distinguished from all the others in the year, by calling it the harvest-moon.

To conceive the reason of this phenomenon; it may first be considered, that the moon is always opposite to the sun when she is full; that she is full in the signs Pisces and Aries in our harvest months, those being the signs opposite to Virgo and Libra, the signs occupied by the sun about the same season; and because those parts of the ecliptic rise in a shorter space of time than others, as may easily be shewn and illustrated by the celestial globe: consequently, when the moon is about her full in harvest, she rises with less difference of time, or more immediately after sun-set, than when she is full at other seasons of the year.

In our winter, the moon is in Pisces and Aries about the time of her first quarter, when she rises

about noon; but her rising is not then noticed, because the sun is above the horizon.

In spring, the moon is in Pisces and Aries about the time of her change; at which time, as she gives no light, and rises with the sun, her rising cannot be perceived.

In summer, the moon is in Pisces and Aries about the time of her last quarter; and then, as she is on the decrease, and rises not till midnight, her rising usually passes unobserved.

But in autumn, the moon is in Pisces and Aries at the time of her full, and rises soon after sun-set for several evenings successively; which makes her regular rising very conspicuous at that time of the year.

And this would always be the case, if the moon's orbit lay in the plane of the ecliptic. But as her orbit makes an angle of $5^{\circ}\ 18'$ with the ecliptic, and crosses it only in the two opposite points called the nodes, her rising when in Pisces and Aries will sometimes not differ above 1 h. 40 min. through the whole of seven days; and at other times, in the same two signs she will differ three hours and a half in the time of her rising in a week, according to the different positions of the nodes with respect to these signs; which positions are constantly changing, because the nodes go backward through the whole ecliptic in 18 years 225 days.

This revolution of the nodes will cause the harvest moons to go through a whole course of the most and least beneficial states, with respect to the harvest, every 19 years. The following table shews in what years the harvest-moons are least beneficial as to the times of their rising, and in what years they are most beneficial, from the year 1790 to 1861; the column of years under the letter L are those in which the harvest-moons are least of all beneficial, because they fall about the descending node; and those under the letter M are the most of all beneficial, because they fall about the ascending node.

Harvest Moons.

L	M	L	M	L	M	L	M
1790	1798	1807	1816	1826	1835	1844	1853
1791	1799	1808	1817	1827	1836	1845	1854
1792	1800	1809	1818	1828	1837	1846	1855
1793	1801	1810	1819	1829	1838	1847	1856
1794	1802	1811	1820	1830	1839	1848	1857
1795	1803	1812	1821	1831	1840	1849	1858
1796	1804	1813	1822	1832	1841	1850	1859
1797	1805	1814	1823	1833	1842	1851	1860
	1806	1815	1824	1834	1843	1852	1861
			1825				

Acceleration of the Moon. See ACCELERATION.

Horizontal Moon.—It is a celebrated phenomenon that the moon appears larger in the horizon than in the meridian; whereas, from its being further from us in the former case than in the latter, it subtends a less angle when in the horizon. It is perhaps not easy to give a satisfactory answer to this deception. Gassendus thought, that as the moon was less bright in the horizon than in the meridian, we looked at it in the former situation, with a greater pupil of the eye, and therefore it appeared larger. But this is not agreeable to the principles of optics, since the magnitude of the image upon the retina of the eye does not depend upon the size of the pupil. Des Cartes thought that the moon appeared largest in the horizon, because when comparing its distance with the intermediate objects it appeared then furthest off; and as we judge its distance greater in that situation, we, of course, think it larger, supposing that it subtends the same angle. Dr. Berkeley accounts for it thus: faintness suggests the idea of greater distance; the moon appearing faintest in the horizon, suggests the idea of greater distance; and, supposing the angle the same, that must suggest the idea of a greater tangible object. He does not suppose the visible extension to be greater, but that the idea of a greater tangible extension is suggested, by the alteration of the visible extension. He says, 1. That which suggests the idea of greater magnitude, must be something perceived; for that which is not perceived can produce no effect. 2. It must be something which is variable, because the moon does not always appear of the same magnitude in the horizon. 3. It cannot lie in the intermediate objects, they remaining the same; also, when these objects are excluded from sight, it makes no alteration. 4. It cannot be the visible magnitude, because that is least in the horizon. The cause, therefore, must lie in the visible appearance, which proceeds from the greater paucity of rays coming to the eye, producing faintness. Mr. Rowning supposes, that the moon appears furthest from us in the horizon, because the portion of the sky which we see appears not an entire hemisphere, but only a portion of one; and hence, we judge the moon to be further from us in the horizon, and therefore larger. Dr. Smith, in his optics, gives the same reason. The same circumstances take place in the sun. Also, if we take two stars near each other in the horizon, and two other stars near the zenith at the same angular distance, the two former will appear at a much greater distance from each other than the two latter. On this account, people are, in general, much deceived in estimating the altitudes of the heavenly bodies above the horizon, judging them to be much greater than they are. The lower part of a rainbow also appears much wider than the upper part; and this may be considered as an argument that the phenomenon cannot depend entirely upon the greater degree of faintness of the object when in the horizon, because the lower part of the bow frequently appears brighter than the upper part, at the same time that it appears broader. Also, faintness can have no effect upon the angular distance of the stars; and as the difference of the apparent distance of the two stars, whose angular distance is the same in the horizon and the zenith, seems to be fully sufficient to account for the apparent variation of the moon's diameter in these situations, it may be doubtful whether the faintness of the object enters into any part of the cause.

MOON-BLINDNESS, a disorder in the eyes of a horse, so denominated from its having been thought to increase or decrease, according to the course of the moon.

This generally happens when a horse is turned five, coming six, at which time one eye becomes clouded, the eye-lids being swelled, and very often shut up; and a thin water generally runs from the diseased eye down the cheek, so sharp as sometimes to excoriate the skin. The veins of the temple, under the eye, and along the nose, are also turgid and full of blood, though sometimes it happens that the eye discharges but little.

Moon-blindness scarcely ever admits of a cure. It generally takes place while the horse is young, and sometimes has been attributed to the pain in cutting their teeth.

The inflammation in this disorder comes

and goes till the cataract is confirmed, and then all pain and running disappear, and the horse becomes totally blind, which is generally in about two years. During this time, some horses have more frequent returns than others, which continue in some a week, in others three or four, returning once in two or three months; and they are seldom so long as five without a relapse.

There is another kind of moon-blindness, which is also the forerunner of cataracts, where no weeping of the eye attends. The eye is here never shut up or closed, but will now and then look thick and troubled; at which time the horse sees nothing distinctly. When the eyes appear sunk and perishing, the cataracts are longer in forming, and it is not unusual in this case for one eye to escape.

MOON-EYED. See MOON-BLINDNESS.

MOON (Mountains of the), mountains of Africa, extending between Abyssinia and Monomotapa. They are higher than those of Atlas.

MOON-SEED. In botany. See MENISPERMUM.

MOON-STONE. In mineralogy. See FELSPATUM.

MOON-TREFOIL. In botany. See MEDICAGO.

MOON-WORT. In botany. See LUNARIA.

MOON-BEAM. *s.* (*moon* and *beam.*) Ray of lunar light (*Bacon*).

MOON-CALF. *s.* (*moon* and *calf*). 1. A monster; a false conception; supposed perhaps anciently to be produced by the influence of the moon (*Shakspeare*). 2. A dolt; a stupid fellow (*Dryden*).

MOON-EYED. *a.* (*moon* and *eye.*) 1. Having eyes affected by the revolutions of the moon. 2. Dim-eyed; purblind (*Ainsworth*).

MOON-FISH. *s. Moon-fish* is so called, because the tail fin is shaped like a half-moon (*Crew*).

MO'ONLESS. *a.* (from *moon.*) Not enlightened by the moon (*Dryden.*)

MO'ONLIGHT *s.* (*moon* and *light.*) The light afforded by the moon (*Hooker*).

MO'ONLIGHT. *a.* Illuminated by the moon (*Pope*).

MO'ONSHINE. *s.* (*moon* and *shine.*) 1. The lustre of the moon (*Shakspeare*). 2. (In burlesque.) A month (*Shakspeare*).

MO'ONSHINE. MO'ONSHINY. *a.* (*moon* and *shine.*) Illuminated by the moon.

MO'ONSTONE. *s.* A kind of stone (*Ainsworth*).

MO'ONSTRUCK. *a.* (*moon* and *struck.*) Lunatic; affected by the moon (*Milton*).

MO'ONY. *a.* (from *moon.*) Lunated; having a crescent for the standard resembling the moon (*Philips*).

MOOR. *s.* (*moer*, Dutch; *modder*, Teut. clay.) 1. A marsh; a fen; a bog; a tract of low and watery grounds (*Spenser*). 2. (*maurus*, Lat.) A negro; a black-a-moor.

To MOOR. *v. a.* (*morer*, French.) To fasten by anchors or otherwise (*Dryden*).

To MOOR. *v. n.* To be fixed by anchors; to be stationed (*Arbuthnot*).

To blow a MOOR. To sound the horn in triumph, and call in the whole company of hunters (*Ainsworth*).

MOOR-COCK. See TETRAO.

MOOR-HEN. See FULICA.

MOOR-TITLING. See MATACILLA.

MOOR'S-HEAD. In the manage: a term denoting the colour of a roan horse, who, besides the mixture or blending of a grey and a bay, has a black head, and black extremities, as the mane and tale.

MOOR LAND, or moory soil, in agriculture, is a black, light, and soft earth, very loose, and without any admixture of stones; and with very little clay or sand. The uppermost stratum of the fen lands is usually of this earth, and it commonly constitutes a moderately thick or deep bed. Intermixed with water it cannot easily be worked up into a paste; and when with labour worked up into somewhat of a firm mass its surface appears spongy and porous; and as soon as dry it easily moulders away to powder. It is usually soft to the touch, unless it be worked very closely between the fingers; then it shows a mixture of a small quantity of sand, both to the touch and to the eye. It seems indeed to consist almost entirely of pure vegetable matter; and this lying in such plenty on the surface of the fen-lands is the cause of their being so very fertile. The great disadvantage of the places which have this soil is their being liable to be glutted with wet; and to remedy the inconveniences arising from thence, the farmers who rent these lands have a custom of burning the soil at proper seasons. It burns very freely and easily, the surface readily catching flame; and a substance somewhat bituminous, usually contained among the soil, helps the burning.

MOORE (Sir Jonas), a very respectable mathematician, fellow of the Royal Society, and surveyor-general of the ordnance, was born at Whitby in Yorkshire about the year 1620. After enjoying the advantages of a liberal education, he bent his studies principally to the mathematics, to which he had always a strong inclination. In the expeditions of king Charles the First into the northern parts of England our author was introduced to him, as a person studious and learned in those sciences; when the king expressed much approbation of him, and promised him encouragement; which indeed laid the foundation of his fortune. He was afterwards appointed mathematical master to the king's second son James, to instruct him in arithmetic, geography, the use of the globes, &c. During Cromwell's government it seems he followed the profession of a public teacher of mathematics; for we find him styled, in the title-page of some of his publications, "professor of the mathematics." After the return of Charles the Second he found great favour and promotion, becoming at length surveyor-general of the king's ordnance. He was it seems a great favourite

both with the king and the duke of York, who often consulted him, and were advised by him upon many occasions. And it must be owned that he often employed his interest with the court to the advancement of learning and the encouragement of merit. Thus, in conjunction with sir Christopher Wren, he got Flamsteed house built in 1675, as a public observatory, recommending Mr. Flamsteed to be the king's astronomer, to make the observations there: and being surveyor-general of the ordnance himself, that was the reason why the salary of the astronomer royal was made payable out of the office of ordnance. Being a governor of Christ's hospital, it seems that by his interest the king founded the mathematical school there, allowing a handsome salary for a master to instruct a certain number of the boys in mathematics and navigation, to qualify them for the sea service. It ought not to be concealed, that the duke of York also took a zealous and active part in determining his brother to found this useful establishment. This foundation presented sir Jonas with an opportunity of exerting his abilities in a manner agreeable to his wishes, namely, that of serving the rising generation. And reflecting within himself on the benefit which the nation might receive from a mathematical school if properly conducted, he made it his utmost care to promote its improvement. In pursuance of his majesty's grant, the school was established; but there was still wanting a methodical institution, from which the youths might receive such necessary helps as their studies required: a laborious work, from which his other great and assiduous employments might very well have exempted him, had not a predominant regard to a more general usefulness determined him to devote all the leisure hours of his declining years to the improvement of such an useful and important seminary of learning. Having thus engaged himself in the prosecution of this generous undertaking, he sketched out a plan or system of mathematics for the use of the school, and afterwards drew up and printed several parts of it himself; but death put an end to his labours, before the work was completed. We are not informed of the year when this event took place; but it could not be long before 1681, when the work was published by his sons-in-law, Mr. Hanway and Mr. Potinger, who spared neither expense nor labour to have it finished in the best manner, and securing proper assistants for that purpose. Besides the New System of the Mathematics, &c. in two volumes, quarto, above mentioned, sir Jonas published, Arithmetic, in two books, viz. Vulgar Arithmetic, and Algebra. To which are added, two treatises, the one a new Contemplation Geometrical, upon the oval figure called the Ellipsis; the other, the two first Books of Mydorgius, his Conical Sections analyzed, 1660, octavo; A Mathematical Compendium; or, useful Practices in Arithmetic, Geometry, and Astronomy, Geography, and Navigation, &c. &c. the fourth edition of which is dated in 1705, 12mo.; A General Treatise of Artillery; or, Great Ordnance. Written in Italian by Thomas Moretii of Brescia. Translated into English, with Notes thereupon, and some Additions out of French for Sea-gunners. By sir Jonas Moore, knt. octavo, with the date of 1688.

Moore (Robert), an English penman and philologist, who succeeded John Ayres as a writing-master in St. Paul's Church-yard, which was about 1708. He published the Writing-master's Assistant; the General Penman, &c.

Moore, or More (Edward), a late ingenious writer, was bred a linen-draper, but quitted business to join the retinue of the Muses; and he certainly had a very happy and pleasing talent for poetry. In his Trial of Selim the Persian, he complimented lord Lyttelton in an elegant kind of panegyric, couched under the appearance of accusation: and his Fables for the female sex, for easy versification, poignant satire, and striking morals, approach nearer to the manner of Gay than any other of the numerous imitations of that author. He wrote also three dramatic pieces; the Gamester, a tragedy; the Foundling, and Gil Blas, comedies. The success of these was not such as they merited: the first of them having met with a cold reception, for no other apparent reason but because it too nearly touched a favourite and fashionable vice: and the second having been condemned for its supposed resemblance to sir R. Steele's Conscious Lovers, but to which good judges have been inclined to give it greatly the preference. Mr. Moore married a lady of the name of Hamilton, daughter to Mr. Hamilton, table-decker to the princesses; who had herself a very poetical turn, and has been said to have assisted him in the writing of his tragedy. One specimen of her poetry, however, was handed about before their marriage, and has since appeared in print in different collections of songs, particularly in one called the Goldfinch. It was addressed to a daughter of the famous Stephen Duck; and begins with the following stanza:

Would you think it, my Duck: (for the fault I must own),
Your Jenny at last is quite covetous grown:
Tho' millions if Fortune should lavishly pour,
I still should be wretched if I had not More.

And after half a dozen stanzas more, in which, with great ingenuity and delicacy, and yet in a manner that expresses a sincere affection, she has played upon our author's name, she concludes with the following lines:

You may wonder, my girl, who this dear one can be,
Whose merit can boast such a conquest as me:
But you shan't know his name, tho' I told you before,
It begins with an M, but I dare not say More.

In the year 1753 Mr. Moore commenced a weekly miscellaneous paper, intitled the World by Adam Fitz-Adam; in which undertaking

he was assisted by lord Chesterfield with some essays. This paper was collected into volumes, and Mr. Moore died soon after.

Moore (Philip), rector of Kirk-bridge, and chaplain of Douglas in the Isle of Man, was the intimate friend of the apostolic Dr. Wilson, bishop of that see, whose funeral sermon he preached. He revised the translation of the Bible into the Manks language: and died universally beloved in 1783.

Moore (Dr. John), was born at Stirling in 1730, and educated for the medical profession. He remained for a considerable period at Glasgow; but when he had attained his fortieth year, an incident occurred that gave a new turn to his ideas, and opened new pursuits and situations to a mind naturally active and inquisitive. James George, duke of Hamilton, a young nobleman of great promise, being affected with a consumptive disorder, in 1769, he was attended by Mr. Moore, who has always spoken of this youth in terms of the highest admiration; but as his malady baffled all the efforts of medicine, he yielded to his pressure, after a lingering illness, in the fifteenth year of his age. This event, which Mr. Moore recorded, together with the extraordinary endowments of his patient, on his tomb in the burying-place at Hamilton, led to a more intimate connection with this noble family. The late duke of Hamilton being, like his brother, of a sickly constitution, his mother, the duchess of Argyle, determined that he should travel in company with some gentleman, who to a knowledge of medicine added an acquaintance with the continent. Both these qualities were united in the person of Dr. Moore, who by this time had obtained the degree of M. D. from the university of Glasgow. They accordingly set out together, and they spent a period of no less than five years abroad, during which they visited France, Italy, Switzerland, and Germany. On their return, in 1778, Dr. Moore brought his family from Glasgow to London, and in the course of the next year appeared the fruits of his travels, in A View of Society and Manners in France, Switzerland, and Germany, in 2 vols. 8vo. Two years after, in 1781, he published a continuation of the same work, in two additional volumes, intitled, A View of Society and Manners in Italy. Having spent so large a portion of his time either in Scotland or on the continent, he could not expect suddenly to attain an extensive practice in the capital; perhaps, indeed, his travels and literary recreations rendered him averse from engaging in the hurry, bustle, and intrigue, incident to the profession of a London physician; he however was, till the time of his death, consulted by his particular friends. As if to prove, however, that he was neither unworthy, nor incapable of employment, in 1785 he published his Medical Sketches, a work, like all his other productions, favourably received; he is, however, supposed to have given some offence to a few narrow-minded men among his brethren, by the disclosure of certain *arcana* which they wish for the sake of their interest to conceal, and therefore consider it as high treason for any one to reveal. The next of our author's works which we shall mention is his Zeluco. This performance abounds with many interesting events, but its chief tendency is directed towards the education of youth, as it fully evinces the fatal effects resulting from uncontrouled passion on the part of a darling son, and unconditional compliance on that of a fond mother. While drawing the character of his hero, the author considers himself employed in "tracing the windings of vice, and delineating the disgusting features of villany." This story is calculated rather to affect the reader with horror, than warn him by example; it abounds, however, with incident, but it is to be hoped that a character so atrocious as that of Zeluco never existed in life, and is only to be met with in the pages of a novel. A great and important event, no less than that of the French revolution, now occupied the minds and writings of the literary world. Dr. Moore, instead of surveying it at a distance, like the bulk of mankind, was lucky enough to contemplate a most critical portion of it on the spot. After his return to England in 1793 he began to arrange his materials, and in 1795 published A View of the Causes and Progress of the French Revolution, in 2 volumes, 8vo, dedicated to the duke of Devonshire. He begins with the reign of Henry IV. and ends with the execution of the royal family. In 1796 appeared Edward: various Views of Human Nature, taken from Life and Manners chiefly in England. In 1800, Dr. Moore published his Mordaunt, being Sketches of Life, Characters, and Manners in various Countries, including the Memoirs of a French Lady of Quality, in 2 volumes, 8vo. This chiefly consists of a series of letters written by the hon. John Mordaunt, while confined to his couch at Vevay, in Switzerland, giving an account of what he had seen in Italy, Germany, France, Portugal, &c. The work itself comes under no precise head, being neither a romance, nor a novel, nor travels: the most proper title would perhaps be that of Recollections. Dr. Moore died at Richmond, early in the year 1802.

MOORING, the act of confining and securing a ship in a particular station, by chains or cables, which are either fastened to the adjacent shore, or to anchors in the bottom. A ship may be either moored by the head, or by the head and stern: that is to say, she may be secured by anchors before her, without any behind: or she may have anchors out, both before and behind her; or her cables may be attached to posts, rings, or moorings, which answer the same purpose.

Moorings, in sea-language, are usually an assemblage of anchors, chains, and bridles, laid athwart the bottom of a river or haven to ride the shipping contained therein. The anchors employed on this occasion have rarely more than one fluke, which is sunk in the water near low-water mark. Two anchors being fixed in this manner in the opposite side of the

Because such allowance would tolerate every vice.

Because scripture excludes such hope.

3d. A state of unprofitableness will be punished;

Because so laid down in scripture.

4th. Where a question of conduct is doubtful, we are bound to take the safe side,

Because whatsoever is not of faith is sin.

Moral obligation.

Moralists all coincide in prescribing the same rules of conduct, but differ in the reasons why we are obliged to pursue such conduct. B. 2. c. 1.

A man is obliged when he is urged by a violent motive resulting from the command of another. B. 2. c. 2.

Why am I obliged to keep my word? B. 2. c. 3.

Because urged by a violent motive (fear of punishment after death) resulting from command of another (God.)

N. B. Punishments after death taken for granted. B. 2 c. 3. s. 2.

To inquire what is our duty is to inquire what is the will of God. B 2. c. 4.

Which may be found,

1st. By his express declaration in scripture.

2d. By the light of nature.

By which inquiring into the tendency of an action to promote or diminish the general happiness, we find the will of God. B. 2. c. 4.

N. B. Actions are to be considered here in the abstract. Note, c. 6.

The Divine Benevolence.

God wishes the happiness of man. B. 2. c. 5.

For he did not wish man's misery;

Because he might have made every object offensive, which he has not.

He was not indifferent about it;

Because, if so, all things came by chance.

The world is full of contrivances, which shew design.

These contrivances for beneficial purposes;

Liable to evil, but not constructed for that purpose.

Utility.

Whatever is expedient is right. B. 2. c. 6.

The utility of a moral rule constitutes the obligation of it.

This is to be judged of by general rules. B. 2. c. 7.

Because actions are expedient or not according to their general consequences. B 2. c. 8.

Of Right.

Right and obligation are reciprocal. B. 2. c 9.

Therefore right signifies "consistent with the will of God." C. 9. and 4.

Right is a quality of persons or of actions. C. 9.

Rights of persons are natural or adventitious, alienable, or unalienable, perfect, or imperfect, C. 10.

Natural rights would belong to a man, although no civil government subsisted, as right to life, &c.

Adventitious would not, as right of a general over his soldiers, &c.

Some rights are alienable, as of property, &c. C. 10. s. 2.

Some unalienable, as of husband over wife, &c.

Rights are perfect, which may be asserted by force, as right to life, &c. C. 10. s. 3.

Imperfect may not, as right of a benefactor to gratitude, &c.

Because indeterminate.

Therefore to assert them by force is inconsistent with the general happiness; that is the will of God. B. 2. c. 4.

Imperfection of a right refers only to force in assertion, not at all to the obligation of a right.

General rights of mankind are those, which belong to the species collectively. B. 2. c. 11.

These are,

1. A right to the fruits of the earth. S. 1.

Because provided for us by God.

2. A right to the flesh of animals. S. 2.

Because given by authority of God for support of life.

Therefore all waste or misapplication of them a sin.

Hence nothing should be exclusive property, which can conveniently be common, and *vice versa*.

The right of extreme necessity. S. 3.

As a right to use or destroy another's property, if necessary to our preservation.

Because division of property was not instituted to operate to the destruction of any.

Institution of property B. 3. c. 2.

Advantages of it.

Increases the produce of the earth. S. 1.

Preserves it to maturity. S. 2.

Prevents contests. S. 3.

Improves conveniency of living. S. 4.

Right of property in land

Not founded on the tacit consent of mankind. B. 3. c. 4.

Because silence is not consent where a person knew nothing about the matter.

Not founded on labour being mixed with it;

Because this is just, only when the value of the labour is proportional to the value of the thing, or where the thing derives its value from the labour.

This plea will not give right in perpetuity;

Nor will it hold in taking possession of a tract of land as a navigator.

The first right of ownership arises from the natural right of man to appropriate to his own use what he stands in need of. B. 2. c. 10. s. 1.—B. 3. c. 4.

This will justify property only as far as a provision for natural exigencies.

The real foundation of our right is the "law of the land" B. 3. c. 4.

Property is established by the will of God. B. 2. c. 2.

Land cannot be divided into property without the regulation of the law of the land. B. 3. c. 4.

Therefore so to regulate it is "consistent with the will of God."

Hence right to property in land does not depend on the manner of the original acquisition, or on the expediency of the law.

Of these principles a bad use may be made.

But he is guilty in *foro conscientiæ*, who abides not by the spirit of the law.

N. B. Property may be regarded as the principal subject of the determinate relative duties.

Promises. ***B.*** **3. *c.* 5.**

The obligation of them arises from the necessity of it to the well-being and existence of society. S. 1.

They are to be interpreted in the sense in which the promiser was conscious the promisee received them. S. 2.

Because in any other sense they would be equivocal.

Hence the obligation depends on the expectations excited.

Therefore tacit promises are binding.

Promises are not binding,

1st. Where the performance is impossible. S. 3.

If the promiser knows this at the time of promise, he raises an expectation which he knows he cannot gratify, that is, breaks a promise.

2d. Where the performance is unlawful;

Because the promiser was under a prior obligation to the contrary.

This holds whether the unlawfulness was known to the parties at the time of the promise, or not.

The reward of a sin, when committed, ought to be paid:

Because performance of the promise does not increase the sin.

A promise is binding, if it be lawful, when demanded, though it were not so at the time of promising.

A promise is not unlawful, when it produces no effect beyond what would have taken place had the promise never been made;

Because the public lose nothing by the promise, when they could have gained nothing without it.

3d. Where they contradict a former promise;

Because the performance is then unlawful.

4th. Before acceptance;

Because no expectation has been voluntarily excited.

5th. Which are released by promisee.

6th In certain cases, where they are erroneous.

7th. Which were made in fear;

Because the general consequences would be hurtful to mankind.

Vows are under the same laws as promises.

Although the violation of them shews want of reverence to the Supreme Being; the performance of them, where they become unlawful, shews greater.

A contract is a mutual promise. B. 3. c. 6.

Therefore is to be interpreted in the same manner.

Contracts of sale. C. 7.

The seller is bound to discover the faults of what he sells;

Because the buyer did not expect them. C. 6.

Passing bad money is an article of this kind.

The tradesman is bound to sell at market price;

Because so expected by the buyer. C. 6.

Innumerable cases must be determined by custom;

Because the contracting parties tacitly include the rules of custom as conditions of sale.

Contracts of hazard.

No advantage is to be taken on either side, which was not expected by the other. C. 6.

Contracts of lending of property,

Which is divided into inconsumable (i. e. where the thing lent is itself to be returned), and consumable (i. e. which can be returned only in kind), as corn, money, &c.

If the thing lent be lost or damaged, who is to bear the loss?

Where the owner foresees the risk, he undertakes it;

Because an implied condition of the contract. B. 3. c. 6.

If an estate, during a lease, be altered in its value, the hirer takes the consequences only of those alterations which might be expected by the parties. C. 6

Contracts concerning the lending of money. B. 3 c. 10.

The prohibition in scripture against usury was meant only for the Jews.

Usury, that is, interest according to the will of the lender, is agreeable to natural equity.

It is necessary that it should be under regulations, as by that means it will contribute to general happiness;

Because it checks the accumulation of wealth without industry.

Because it enables men to adventure in trade.

Because it enables the state to borrow.

Money borrowed in one country and paid in another is to be paid so that the lender is not the sufferer. C. 6.

So if the value of coin be altered,

A man is bound to pay money, when any lawful method is in his power;

Because on this security credit was given. B. 3. c. 6.

Imprisonment of insolvent debtors is just, being a public punishment for a crime. B. 3. c. 10. B. 2 c. 8.

Properly put in the power of the creditor, because he is most likely to be vigilant, and because it adds to his security.

It is unjust in the creditor to imprison an unfortunate debtor;

Because he punishes where there is no crime according to the spirit of the law.

Contracts of service. B. 3. c. 11.

The master's authority extends no farther than the terms of the contract will justify.

Contracts of service are subject to the same laws as promises are.

Rules of custom are tacit conditions of the contract.

The master is responsible for every thing done by a servant under the general authority committed to him.

Because people act with the servant under this expectation.

To give a bad servant a good character is criminal.

The reverse of this is equally, if not more criminal.

A master is obliged to check vice in his domestics;

Because he has authority, which he is ordered by scripture to use for that purpose.

Contracts of labour.

Commissions. B. 3. c. 12.

Whoever undertakes another's business, promises to employ the same care upon it as if it were his own, and no more.

These cases are subject to the same laws as promises are. Vid. b. 3. c. 5.

Partnership. C. 13.

Binding in the same respects as all contracts, that is, promises.

Division of stock must depend on custom or agreement.

According to natural equity the profits should be divided between the labouring partner, and him who provides money, in the proportion of interest of money to the wages of labour.

Offices. C. 14.

In offices, as fellowships of colleges, &c. a man performs his duty who performs what his electors expected of him.

Because this was the expectation on both sides at the time of contract.

An office may not be discharged by a deputy,

1st. Where confidence is reposed in the particular abilities of the person elected.

2d. Where the custom hinders.

3d. Where the duty from its nature cannot be so well performed by a deputy.

4th. Where to employ deputies from general consequences would be bad, as in the army.

Non-residence of parochial clergy does not fall under these heads.

Revenues of the church are a common fund for the support of the national religion.

So to be judged of in its distribution.

Lies. C. 15.

A lie is a breach of promise; because in discourse there is a tacit promise to speak the truth.

The general consequences of lying are bad:

Because confidence is necessary to the intercourse of society.

Hence "white lies" are not entirely innocent.

(They habitually lead to others of a darker complexion.)

Hence too *pious* frauds, though meant to do good, are highly injurious to the cause of religion.

There are falsehoods which are not lies, and therefore not criminal.

1st. Where no one is deceived, as in novels, &c.

2d. Where no inconvenience results from the want of confidence in such cases, as where you tell a falsehood to a madman, a robber, &c.

Upon this principle we may deceive an enemy by feints, spies, &c. in war.

But by no means in treaties, truces, &c.

Any wilful deceit is a lie.

A man may *act* a lie.

There are lies of omission, as where you conceal part of the truth.

Oaths. C. 16.

Forms of oaths vary in different countries. S. 1.

The signification is the same, viz. the calling of God to witness. S. 2.

Our Saviour's words concerning oaths relate not to judicial, but wanton oaths. S. 3.

Oaths receive their obligations from a belief that God will punish perjury, which we have reason to think he will. S. 4.

1. Because the perjurer implies a disbelief of God's power, or contempt of it.

2. Because perjury violates a superior confidence, and therefore it is hurtful in its general consequences.

Hence a quaker's word, if broken, incurs the guilt of perjury.

Promissory oaths are not binding where the promise would not be. Vide B. 3. c. 5.

An oath is designed for the security of the imposer, therefore it is just "*jurare in animum imponentis.*"

Oath in evidence. C. 17.

The witness swears to speak the whole truth.

Therefore to conceal part is perjury.

This oath is not binding in some cases according to the law of the land, that is, *animus imponentis.*

Oath of allegiance. C. 18.

Ascertains not the extent of the subject's obedience, but the person to whom it is due.

The oath excludes

1. All intention to support the claim of another.

2. All design, at the time, of deposing the reigning prince.

3. All opposition from private views.

It permits

1. Resistance to the king, if beneficial to the community.

2. Disobedience to unlawful commands.

3. Does not require allegiance after he is deposed.

Oath against simony. C. 20.

Was meant to restrain the patron of a piece of preferment from being influenced in his choice of a presentee by a bribe or any benefit to himself.

The law determines what is simoniacal contract.

1st. Purchasing a benefice already vacant

2d. A clergyman purchasing the next turn of a benefice for himself directly or indirectly.

3d. The procuring of any preferment by ceding to the patron any right or portion of profit.

4th. A bond to resign upon demand.

Oath to observe local statutes. C. 21.

The *animus imponentis,* that is, the measure of the juror's duty, seems to be satisfied, when nothing is omitted, but what from change of circumstances the founder, it may be presumed, would have dispensed with.

To come within this rule, the inconveniency must be manifest by being unlawful, impracticable, or prejudicial to the end of the institution.

Subscription to articles of religion. C. 22.

The subscriber's assent is governed by the same rule of interpretation as oaths are, that is, the *animus imponentis.*

The imposer, whose intention is to be satisfied, is the legislature of the 13th Eliz.

It is impossible that the legislature could expect the assent of ten thousand men, and that in perpetual succession, to many hundreds of controverted propositions.

The intention was to exclude from offices in the church,

1. All abettors of popery.

2. Baptists, at that time a powerful party on the continent.

3. The Puritans, who were hostile to an episcopal constitution.

4. In general the members of such leading sects, or foreign establishments as threatened to overthrow our own.

Some limitations of the patrons choice may be necessary to prevent unedifying contentions between neighbouring teachers, or between the teachers and their congregations.

This danger, if it exist, might be obviated by converting the articles of faith into articles of peace.

Wills. C. 23.

The disposal by will of the produce of personal labour is a natural right;

Because there is no limit to the continuance of the right.

With respect to other property, as of land, the right is adventitious;

1. Because at the death of the possessor his want of it ceases. Vide, B. 3. c. 4.

2. Because if a man possesses any right of disposal, he possesses a right of disposal for ever, which is absurd.

Therefore this right is received from, and is to be regulated by, the law of the land.

Hence, if informal, the will is not binding;

Because the conditions, upon which the right was obtained, were not complied with.

Succession to intestates must be regulated by the law of the land.

There are many *imperfect duties* in respect to the making and observing of wills. Vide, B. 1. c. 3. s. 1.

Such as respect to the intention of the deceased,

Impartial love of children, &c.

Provision for poor relatives.

Charity. B. 3. c. 1. p. 2.

Is the promoting of the happiness of our inferiors, of doing which there are three principal methods:

First method. By tender treatment of our domestics and dependents. C. 2.

It is our interest; for they will shew their gratitude by being serviceable, and our obligation to them is much greater than theirs to us.

It is our duty; because we are forbid to diminish the sum of human happiness.

All uneasiness therefore, which we occasion without a just cause, is wrong.

The same is applicable to slaves;

Because founded on a principle independent of the contract of service.

Slavery. C. 3.

Is an obligation to labour for another without consent of the servant.

This may arise from crimes, captivity, or debt.

The continuance ought to be in proportion to the crime.

The slave trade can be excused by none of these principles.

The necessity pleaded for it is ridiculous.

The Christian scriptures interfere with no civil institution, and therefore not with slavery.

If they had, a *bellum servile* might have ensued.

This does not argue against a gradual emancipation.

2d method. By professional assistance. B. 2. c. 4.

This kind of beneficence is chiefly to be expected from members of the legislature, magistrates, legal and sacerdotal professions.

Because the law cannot provide for the poor in these cases, and the rich can take care of themselves.

Every professional man has it in his power to do the greatest good at the least expence.

3d method. By pecuniary bounty. C. 5.

We are obliged to bestow relief on the poor. S. 1.

(The impulse we feel indicates the divine intention.)

1. Because property was divided that all might have a sufficiency. Vide B. 2. c. 4.

2. Because the scripture enjoins us to bestow relief.

The manner of bestowing it. S. 2.

It is better to give a considerable sum among few, than the same sum among many.

To give to public charities is eminently useful, because in them money goes farther.

Indiscriminate relief to beggars is not to be encouraged.

That charity is most useful which promotes industry.

Charity is not to be kept secret, if by being published it may be useful in influencing others.

Few excuses for not giving relief are just. S. 3.

Resentment,

May be distinguished into anger and revenge. B. 3. c. 6. p. 2.

Anger is involuntary in some degree. C. 7.

Therefore, if checked, is no crime.

Is sinful, if it is suffered to continue long.

This is the doctrine of scripture.

Reflections, which may appease it, are numerous.

Revenge, C. 8.

Is the infliction of pain on another, in consequence of an injury received from him, farther than the just ends of reparation or punishment require.

Is forbidden by scripture, which forbids the neglect even of imperfect duties towards an enemy.

At the same time the punishment of public offenders is permitted,

Because necessary to public happiness.

So, if it be from a good motive, correction of vice is proper in individuals.

It is productive of good.

Witness the seclusion of bad women from the company of women of character.

Duelling, C. 9.

As a punishment absurd,

Because the person offended may be the sufferer.

So also as a reparation,

Because it does not undo the injury.

It is complied with for the sake of fashion.

Regard for reputation will not justify murder.

In expostulating with the duellist, we have a right to suppose his adversary to fall,

Because if he has no right to kill, he has no right to attempt it.

Where the injury is forgiven, and both parties fight for reputation's sake, there is no distinction between the guilt of him who accepts, and him who gives the challenge.

The law on this head is insufficient;

But opinion cannot be controlled by civil institutions;

Therefore a court of honour or something similar seems the only remedy.

Litigation, C. 10. p. 2.

Is not inconsistent with any rule of the gospel, when it is instituted with a view to the public good, or with a view to the ends of justice and safety.

It becomes unjust when instituted from any other motive, and when it is carried on in any manner that does not most readily promote these ends.

It is our duty to bring an offender to punishment, when it is conducive to the public good.

Gratitude, C. 11.

Is a duty, because the violation of it would be pernicious in its general consequences;

Because the love of God cannot exist without it.

It does not supersede other duties.

Slander, C. 12.

Slander is the producing of gratuitous mischief.

Speaking is acting, if the mischief and motive are the same.

Truth may be instrumental to the success of malice.

If the end is bad so are the means.

The guilt must be measured by the misery produced.

The guilt of inconsiderate slander consists in want of regard to the general consequences

Therefore shews want of just affection for human happiness.

Of relative duties, which result from the constitution of the sexes. B. 3. p. 3.

The constitution of the sexes is the foundation of marriage.

Collateral to the subject are fornication, seduction, adultery, incest, polygamy, divorce.

Consequential to it are the reciprocal duties of parent and child.

Use of marriage institutions. C 1.

They promote

1st. The private comfort of individuals, especially of females.

Whatever promotes the happiness of the majority, is binding upon the whole.

2d. The better production of children, and provision for them.

3d. The peace of society.

4th. The better government of society. S. 4. and 5.

5th. The encouragement of industry.

Fornication. C. 2.

The guilt of it consists in,

1st. Its tendency to diminish the number of marriages.

2d. Encouragement of prostitution and its miseries.

3d. Encouragement of habits of lewdness.

Consequently it incurs the guilt of the general consequences of lewdness.

4th. The perpetuation of a loathsome disease.

It is expressly forbid by Scripture.

Licensed brothels vitiate the public opinion.

The keeping of a mistress is not the same as marriage, because not so beneficial to the woman and her children.

Is a crime,

1st. Because it is fornication.

2d. Because it is pernicious in its general consequences. B. 2. c. 8.

Seduction. C. 3.

Is a fraud of which the injury is threefold.

1st. To the woman, who suffers the pain of shame and sustains the loss of her reputation, and generally of her moral principle.

The evils arising to the woman in consequence are great, and the seducer incurs the guilt of them.

2d. To the family.

3d. To the public, who lose a valuable member of society.

Adultery. C. 4.

Where the man solicits the chastity of the woman, he incurs the guilt of seduction in every respect.

The crime of both parties is aggravated by the extreme misery brought upon the husband, and children.

The guilt is independent of discovery, because such conduct is pernicious in its general consequences;

And is a breach of the marriage vow before God.

Prior transgression of either party is no justification;

Because the marriage vow does not depend on reciprocal fidelity.

The Scripture makes a difference between fornication and adultery.

Christ's opinion of the magnitude of the sin cannot be inferred from his words to the adulterous woman.

He told her, she had "sinned."

Incest. C. 5.

Should be kept in utter abhorrence to preserve chastity in families.

Restrictions extending to remove degrees of kindred are founded on positive laws,

Which are justifiable because beneficial in their general consequences, in diffusing wealth, &c.

Polygamy. C. 6.

May be judged to be against the will of God,

Because he has created very nearly equal numbers of each sex,

And because it is hurtful in its general consequences.

For 1st. It distracts the affections.

2d. It dissolves the vigour of the faculties.

3d. It debases half the creation.

4th. It provides less for the children.

It produces no benefit in population.

The words of Christ, "whosoever putteth away his wife, and marrieth another, committeth adultery," imply a prohibition of it.

It is retained only where Christianity is not professed.

Divorce. C. 7.

By divorce is meant the dissolution of the marriage contract at the will of the husband.

If it be by mutual consent, it is equally liable to objection.

Except on account of the duties, which parents owe to their children, there is no reason in nature why marriage should not be dissoluble like other contracts.

General consequences require that it should be indissoluble.

1. Because it tends to preserve concord between the parties.

2d. Because new objects of desire would continually be sought after, if men could at will be released from the matrimonial tie.

The law of nature admits of an exception in favour of the injured party in cases of adultery, desertion, &c.

By no means in case of peevishness, &c. though not trivial reasons; because the unhappiness of one pair must be sacrificed to general consequences.

The Scripture allows divorce only in cases of adultery. So does the law of the land.

Inferior causes may justify the separation of the parties, if the care of the children does not require that they should live together;

In cases of tyranny in the husband the law provides a divorce *a mensa et thoro*;

In these cases the marriage is not dissolved, because the general consequences would be hurtful.

Sentences, which release the parties *a vinculo matrimonii*, do not dissolve a marriage; but declare that it never existed.

Marriage, C. 8.

Is a religious ceremony from custom only.

Which part should give the dowry has been settled by fashion.

As it is at present, it secures to women that assiduity and respect, which are wanted to compensate for the inferiority of their strength.

What duties the vow creates are expressed in the ceremony.

It is witnessed before God; therefore, if broken, incurs the greatest guilt of a violated oath.

Obedience on the part of the wife is ordered, because it is necessary that one party should submit.

He may conscientiously marry, who wishes and expects to entertain an affection for his wife.

The marriage vow is violated,

1st. By adultery.

2d. By behaviour, which knowingly renders the life of the other miserable.

The law of the land makes the consent of the parents necessary, under certain restrictions.

Duty of parents, C. 9.

Is of great importance in the class of duties from its general consequences.

Admits of definite rules, which may be explained under the heads of

1st. Maintenance,

Because somebody must maintain the children, and parents have no right to burthen others.

Nature indicates it in the person of the mother.

The Scriptures order it.

2d. Education;

Because necessary for the child's well-being in society.

3. A reasonable provision for the child's happiness in respect to outward condition, which requires three things.

1st. A situation suited to his reasonable expectations and habits.

2d. A provision for that situation.

(These articles must vary with the condition of the parent.)

Hence children should be preserved in that class in which they were born, or in which others of similar expectations are accustomed to be placed.

Hence a parent is justified in making a difference in his children according as they stand in greater or less need of his fortune from circumstances.

After their exigencies, the expectations of children may be satisfied according to primogeniture.

This point, together with general expediency, makes the difference of claim between legitimate children and bastards.

Still a parent is bound to provide for a bastard.

After a provision for exigencies, a parent may proportion his childrens' shares according to their behaviour.

Disinherison, nearly absolute, is justifiable only in case of utter incapability of managing an inheritance.

The third thing required in a provision for the child's happiness, is a probable security for his virtue.

This may be attained,

1st. By impressing on his mind the idea of accountableness.

2d. By shewing a good example.

3d By correcting his early inclinations, and disposing of him in a situation least dangerous to his particular character.

The rights of a parent, C. 10. b. 3. p. 3.

(That is, such as may be enforced by coercion) result from their duties.

A parent has a right to that authority, which is necessary in the exercise of his duties.

Hence a guardian has the same.

Parents have a right to choose professions for their children;

Because it is necessary to determine before they can judge for themselves.

In competition of commands the wife here also owes obedience to her husband.

Parents have no right over the lives of their children, or to sell them into slavery.

They exceed their authority when they consult their own interest at the expence of their childrens' happiness.

Duty of children. C. 11.

May be considered,

1st. During childhood.

Here the childrens' submission must be implicit.

2d. After they have attained to manhood, and continue in their parent's family.

Beside the general duty of gratitude to parents, they are bound to observe the regulations of the family.

3d. After they have attained to manhood, and have left their father's family.

In this state the duty to parents is simply the duty of filial gratitude, which just so much exceeds other obligations, by how much a parent has been a greater benefactor than any other friend.

It requires of children to endeavour by every means to promote their parents' comfort, and to contribute to their support, if they stand in need of it.

A parent has no right to destroy his childrens' happiness.

He has therefore no right to oppose his childrens' marriage where they have a real inclination, or to force them upon one which they dislike.

In this latter case the child must become guilty of prevarication; and parental, like all human authority, must cease, where obedience is criminal.

Nor has a parent a right to compel a child to choose a profession, to which he may be averse.

In every case the child is bound by gratitude to try earnestly, and with sincerity, to conquer his own inclinations, before he may act for himself.

A parent has no right to interfere, where a trust is reposed personally in the son. Vide B. 3. p. 2. c. 11.

The duty of children is commanded by God.

Duties to ourselves. **B. 4.**

This division is retained for the sake of method.

Whether in a state of nature we may defend the most insignificant perfect right by any extremity is very doubtful. B. 4. c. 1.

Because we cannot so easily balance between the general consequences of yielding, and the particular effect of resistance, which the person attacked is bound to do.

This right is suspended by the establishment of civil society.

Hence the individual injured is bound to submit to public arbitration.

Where it may be necessary for our preservation, all extremities are justifiable.

This is evident in a state of nature, nor is the case altered in civil society.

Because, by supposition, the laws cannot interpose to protect, nor can they compel restitution.

The defence of chastity seems to justify the same extremities.

In other cases the law of the land is our best guide.

Hence homicide, in England, is justifiable.

1st. In preventing the commission of a crime, which when committed would be punishable with death.

2d. In necessary endeavours to carry the law into execution.

N. B. The rights of war are not here taken into the account.

Drunkenness. **C. 2.**

Casual excesses incur all, in some degree, of the guilt and danger which attend habitual drunkenness;

We compute the guilt of it from its bad effects, which consist,

1st. In its betraying most constitutions into extravagances of anger or sins of lewdness.

2d. It disqualifies men for the duties of their station.

3d. It is attended with expences, which can seldom be spared.

4th. It creates uneasiness to the family of the drunkard.

5th. It shortens life.

These consequences may not all meet in the same subject; but the great mischief of example is sure always to ensue.

It is forbidden in the Scriptures.

The guilt of any action of a drunken man bears the same proportion to the guilt of the like in a sober man, that the probability of its being the consequence of drunkenness bears to certainty.

Suicide, **B. 4. c. 3.**

Rests on this question. "May every man who pleases to destroy his life, innocently do so?"

Whatever rule or limit for suicide is assigned, must lead to a toleration of it in all cases in which there is danger of its being committed.

The general consequences of such toleration would be,

1st. The loss to the community of many valuable lives.

2d. The affliction of many families, and consternation of all.

3d. The throwing off an opportunity of meliorating our condition in a future state.

Every case must also be aggravated by particular consequences.

Scripture implies the sin of suicide.

1st. By speaking of human life as a term prescribed to us.

2d. By inculcating patience as a great virtue.

3d. By the conduct of the apostles.

The above does not argue against the right of a state over the lives of its subjects.

Because the state receives this power not from the consent of collected individuals, but from the will of God. B. 3. c. 4.

Duties towards God, **B. 5.**

Signify duties, of which God is the object.

Silent piety, acceptable as it is to God, does not supersede the external duties; which may be divided into worship and reverence.

Worship is made up of adoration, thanksgiving, and prayer;

Prayer comprises them all.

Of the duty and efficacy of prayer, as it appears from the light of nature. C. 2.

It is probable God expects those intreaties from us, which we naturally use to every being on whom we depend.

The same may be said of thanksgiving.

Prayer is necessary to keep up a sense of God's agency.

The duty of prayer depends on its efficacy;

Which the perfect wisdom of the Deity does not argue against.

For he may withhold a favour unless requested by prayer;

1st. Because, on that very account, it may produce good effects on the person.

2d. Because it may encourage devotion.

3d. Because prayer has a tendency to amend the petitioner himself.

It is not necessary to devotion that the petitioner should know the circuit of causes by which his prayers may prevail.

We have no proof that inexorability is a part of that perfect wisdom which is explained to consist in bringing about the most beneficial ends by the most beneficial means.

To say God must act by one, or any rule, is to assert what is beyond our comprehension.

It is no objection to the efficacy of prayer that the effects of it are not always obvious,

Because it is beneficial that they should not be.

The custom of employing one person to intercede for many is justifiable,

For the happiness of many often depends on the good offices, and why may it not on the intercessions of one individual.

Of the duty of prayer as represented in Scripture. C. 3.

The Scriptures not only affirm the propriety of prayer in general, but furnish precepts which justify particular topics and modes of prayer.

They teach the duty and efficacy of prayer in general.

Also of prayer for particular favours by name;

Of prayer for public national blessings;

Of intercession for others;

Of the repetition of unsuccessful intreaties.

Private prayer, family prayer, public worship. **C. 4.**

Each has its use, and therefore does not supersede the others.

Private prayer enables men to state wants, which cannot be the subject of public prayer. S. 1.

It is generally accompanied with more actual

and solemn thoughts, which make a lasting impression.

It is particularly sanctioned by our Saviour.

Family prayer. S. 2.

Is particularly useful from its influence upon the members of a family.

Public worship. S. 3.

By this means a great part of mankind are instructed in religious knowledge, who would otherwise not be.

As the general consequences of the example are good, every individual is bound by the general rule to attend.

Public worship has also these advantages,

1st. It has a tendency to unite mankind together, and to enlarge the generous affections.

2d. It promotes humility in the higher, and proper dignity in the lower class of mankind, by placing them under the impression of considering their equal relation to the Deity.

Of form of prayer in public worship. C. 5.

Liturgies not being enjoined or forbidden in Scripture must be judged of by their expediency.

A liturgy,

1st. Prevents absurd or extravagant addresses to God.

2d. It prevents the confusion of extempore prayer.

3d. It supplies, in some measure, the imperfections of the deliverer.

Joint prayer, which is the end of a congregation, without a liturgy, is impossible.

Our Saviour authorises a fixed form of prayer by appointing the Lord's prayer.

The properties required in a liturgy are,

1st. That it be compendious.

Brevity may be studied too much, for it is necessary that the attention, which slumbered in one part, may be recalled in another.

2d. That it express just conceptions of the divine attributes,

Because by it the popular notions of God are formed.

3d. That it recite such wants as the congregation are likely to feel, and no other.

Upon this principle our state prayers are too long.

4th. That it contain as few controverted propositions as possible.

The use of sabbatical institutions. C. 6.

That seasons should be set apart for religious worship is founded on the reasons that make worship a duty.

That they be at stated intervals, and be observed by all at the same time, is easiest and best for the community.

The day appointed may be Sunday, as well as any other day.

This reasoning refers only to the time occupied in divine service.

The manner of the christian sabbath is to be defended upon its general expediency.

1st. It contributes better to the happiness of the laborious part of mankind than any casual indulgencies of leisure.

(Nothing is lost by this interruption of public industry.)

2d. It leaves an opportunity for religious meditation.

3d. It gives happiness to the brute creation.

Of the Scripture account of sabbatical institutions. C. 7.

The Jewish sabbath was first instituted in the wilderness.

For it is never mentioned till then, and Ezekiel and Nehemiah speak of it as being so.

The historian in Gen. c. 2. writing after it was instituted, there gives the reason of its institution.

The Jews abstained from every kind of work, and permitted their slaves and cattle to rest; they sacrificed double sacrifice, and held holy convocations on this day.

Two questions concern the christian moralist,

1st. "Whether the command by which the Jewish sabbath was instituted extends to Christians?"

It appears not;

For it seems to have been part of the peculiar law of the Jewish policy;

Because it was first immediately directed to the Jewish people alone.

The sabbath is described as a sign between God and the people of Israel.

It is in its nature a ceremonial institution, like other seasons appointed by the Levitical law.

If it be binding on Christians, it must bind as to the day, &c. which are not regarded.

The observance of the sabbath is not one of the articles enjoined by the apostles in Acts, 15th chap.

St. Paul mentions it as a Jewish ritual.

The two objections to the command's not being of universal obligation are,

1st. The reasons given for it in the fourth commandment.

2d. Its being one of the decalogue.

These are of no weight:

The first; because different reasons were given to account for different circumstances in the command;

The second; because in the Scriptures, positive duties, which are of partial, and natural, which are of universal obligation, are indiscriminately enumerated.

The second question is, "Whether Christ delivered any new command upon the subject, or whether any day was appropriated to the service of religion by the authority or example of the apostles?"

It appears that there was,

Because the holding of religious assemblies on the first day of the week was so early and universal a custom in the christian church.

The apostles seem to have practised it.

A cessation upon that day from labour was not ordered,

Because the Jews, to whom the gospel was first preached, had already a sabbath of rest.

It does not appear that Christ or his apostles meant the Jewish custom to be retained, the day only being changed.

From all above it appears,

That assembling upon the first day of the week for divine worship is a law of christianity;

That the resting on that day is a human institution;

Which is binding on individuals because of its beneficial general consequences,

And is recommended by its subserviency to many of the uses for which God appointed it to the Jews.

By what acts and omissions the duty of the christian sabbath is violated. C. 8.

The duty of the day is violated by whatever opposes the uses of its institution. Vide C. 6.

Wherefore it is violated,

1st. By any engagement, which hinders our attention on divine worship, or giving some time to religious meditations.

2d. By unnecessary encroachments on the rest and liberty of those, who may be under our authority.

3d. By such recreations as are usually forborne from respect to the day.

Any encroachment upon the line of distinctions in this latter instance is wrong, because pernicious in its general consequences.

Gaming upon this day cannot be harmless, on account of its effect upon the temper of the mind.

Of reverencing the Deity. C. 9.

A sense of awe whenever the idea of the Supreme Being is presented to the thoughts, is a considerable security against vice.

It is the effect of habit.

Levity in speaking of the Deity destroys this habit.

God, perhaps for this reason, forbade the vain mention of his name.

Our Saviour extends the prohibition to every thing associated with the idea of God.

The offence of profane swearing is aggravated by the slenderness of the temptation to it.

Ridicule upon the Scriptures falls within the mischief of the law, which forbids the profanation of God's name; especially as it is extended by Christ.

That man can have little regard for his own welfare in a future state, who respects not every, the most trivial attention to it in another person.

Such is the infidel, who mocks at the superstitions of the vulgar.

One unbeliever assumes the follies, which have adhered to the creed, as the doctrines of Christians, endeavouring thereby to subvert the whole system.

Another relates the vices of the sacerdotal order, endeavouring thereby to connect the character of the clergy, with the truth of christianity.

A third triumphs in collecting accounts of the wars and massacres occasioned by religious zeal, as if the vices of Christians were parts of christianity.

A fourth displays the succession and variety of popular religions, representing christianity as the superstition of the day.

These men aim at victory, not at truth,

Therefore can have no religious frame of mind.

They transgress the laws of reasoning and decency, and do not act honestly with mankind;

Because by matter calculated to produce effects beyond its real weight, they try to cheat men of a belief in a religion, which holds forth assurances of immortality.

The dishonesty is greater where the matter comes in the dress of insinuation, a sneer, or, as has been the case, of obscenity.

The latter works its effect independent of reason.

A sneer, who can refute?

They are both as formidable to a true religion, as a false one.

This licentiousness can scarcely be tolerable even to those men, who see little in christianity, supposing it to be true.

Let this class of reasoners reflect,

That if Christ had delivered no other declaration than, "The hour is coming, in the which all that are in the graves shall hear his voice, and shall come forth; they that have done good, unto the resurrection of life, and they that have done evil, unto the resurrection of damnation;" he had pronounced a message of inestimable importance.

A future state had never before been discovered, because it had never been proved; and no man can prove this point, but the teacher who testifies by miracles that his doctrine comes from God.

MORAL SENSE, the faculty whereby we discern or perceive what is good, virtuous, beautiful, &c. in actions, manners, characters, &c.

A late author has endeavoured to prove, that it is a peculiar sense whereby we get the ideas of these things; and denominates it a moral sense. See SENSE.

MO'RALIST. *s.* (*moraliste*, French.) One who teaches the duties of life (*Addison*).

MORA'LITY. *s.* (*moralité*, Fr. from *moral.*) 1. The doctrine of the duties of life; ethics (*Baker*). See MORAL PHILOSOPHY. 2. The form of an action which makes it the subject of reward, or punishment (*South*).

To MO'RALIZE. *v. a.* (*moraliser*, Fr.) To apply to moral purposes: to explain in a moral sense (*L'Estrange*).

To MO'RALIZE. *v. n.* To speak or write on moral subjects.

MO'RALIZER. *s.* (from *moralize.*) He who moralizes.

MO'RALLY. *ad.* (from *moral.*) 1. In the ethical sense (*Rymer*). 2. According to the rules of virtue (*Dryden*). 3. Popularly (*L'Estrange*).

MO'RALS. *s.* (without a singular.) The practice of the duties of life; behaviour with respect to others (*South*).

MORASS, a marsh, fen, or low moist ground, which receives the waters from above without having any descent to carry them off again. Somner derives the word from the Saxon *merse*, lake; Salmasius from *mare*, a collection of waters; others from the German *marast*, a muddy place; and others from *marese* of *mariciturn*, *a mariscis*, i. e. rushes. (See BOG, FEN, and DRAINING.) In Scotland, Ireland, and the north of England, they have a peculiar kind of morasses called mosses or peat-mosses, whence the country people dig their peat or turf for firing. See MOSS.

MORAT, a town of Swisserland, in the Vaudois, situated on the south-east side of a lake, to which it gives name. Near it is a chapel, filled with the bones of the Burgundians who perished in the siege of this town, in a battle with the Swiss, in the year 1476. It is the capital of a district: twelve miles W. Berne, and twenty-two S.S.W. Soleure.

MORAVA, or MORAW, a river of Germany, which has its source on the confines of Bohemia and Silesia. It crosses Moravia, where it waters Olmutz and Hradisch, and receiving the Toya, from the confines of

Lower Hungary and Upper Austria, separates these two countries as far as the Danube, into which it falls.

MORAVIA (Marquisate of), a country of Germany, bounded on the north by Bohemia and Silesia, on the east by Silesia and Hungary, on the south by Austria, and on the west by Bohemia; containing about 1400 square miles. Towards Hungary, Bohemia, and Silesia, it is partly environed by mountains, and partly by woods. Above one half of it is mountainous and woody, and many of the former are so rough, as to be almost desolate. In the more champaign circles, tracts, and parts, are many morasses, bogs, and lakes. In the mountainous regions, the air, indeed, is rough and cold, so that in many places, for near the whole summer, the inhabitants must use a stove; but these parts, notwithstanding, are wholesomer than the abovementioned champaign territories. More corn grows here than the inhabitants consume. In it is also plenty of hemp and flax; nor are table fruit-trees or vegetables wanting. It produces, likewise, good saffron. Some white and red wine is made in those tracts lying towards Hungary and Austria, which are in no respect inferior to the Austrian territories. The pasturage is good, and maintains all sorts of cattle. It is remarkable, that in some places they also dig frankincense and myrrh out of the earth. Game is plentiful. There is no want of venison here; there are likewise wolves, bears, and a species of leopards, of the size of dogs, but thicker, which are called Rysowe, with some beavers. In the circle of Brunn, are quarries of marble, bastard diamonds, amethysts, and other minerals, alum, iron mines and works. In the circle of Znaym, were formerly mines of gold; and, at this day, are some of iron, sulphur, salt-petre, and vitriol. Here and there are some mineral springs, which are impregnated with sulphur, alum, vitriol, and salt-petre; and there are likewise acid springs, but salt they want. The number of towns, villages, and market-towns in Moravia, has been estimated at 2550. The language of the inhabitants is a dialect of the Sclavonic, and little differing from the Bohemian. The German language, too, is very common in Moravia. The states of the country consist of the clergy, lords, knights, and burgesses. Christianity was introduced so early as the eighth century. The whole country is of the Roman Catholic church, and subject to the ecclesiastical jurisdiction of the bishop of Olmutz. The principal articles of commerce consist in their manufactures of cloth, iron, glass, paper, gunpowder, &c. which, on the whole, are considerable. Moravia was anciently inhabited by the Quadi, who were driven out by the Sclavi. While belonging to the latter, it was of greater extent than at present. The kings of this country were, till the ninth century, powerful and independent; but afterwards, the emperor Charlemagne not only vanquished king Lech, but his son and successor Louis made king Mogemir also his vassal. A part of it, which, to this day, alone bears the name of Moravia, the Bohemian dukes Brzetislaw and Ulrich, in 1026, reduced by force of arms; and the former, on his death, was reckoned among the princes thereof. From that time, this country having, in the year 1086, been declared a marquisate by the German king, Henry IV, and united with Bohemia, has been frequently resigned as a fief, by the dukes and kings of Bohemia to their sons, brothers, or relations, and sometimes even divided. Since the time of king Mathias, Moravia has enjoyed no peculiar margrave of its own, but has constantly remained annexed to the crown of Bohemia. Moravia contributes about one-third part to the exactions which Bohemia pays. Towards the maintenance of the military state of the whole Austrian heriditary countries, it contributes yearly 1,856,490 florins. Seven regiments of foot, one of cuirassiers, and one of dragoons, are at present quartered in Moravia. The whole marquisate is divided into six circles, each of which has its circle-captain, whose authority extends to the quartering, marching, and maintenance of the soldiers. Olmutz is the capital.

MORAVIANS, Herrnhutters, or Unitas Fratrum, in church history, a denomination of Christians, concerning whose origin, history, and character, various contradictory reports have been published. Crantz divides their history into what he calls ancient and modern. The former refers to them before the time of their settlement in Upper Lusatia, in 1722; the latter after that period. The United Brethren claim the famous Huss, and Jerome of Prague, as their martyrs. M. Crantz, however, places the beginning of the church of the United Brethren in the year 1457, and says, that it arose out of the scattered remains of the followers of Huss. In the year 1450 this people became re-united to the Greek church; but on the taking of Constantinople by the Turks about two years afterwards, that union was again dissolved. After this, various attempts were made to form them into a regularly constituted church, but without success. At length, after many vexations and commotions among themselves, and sundry persecutions from others, they obtained permission to withdraw to a part of the king's domain, on the boundary between Silesia and Moravia. In the same year, 1457, they formed their church fellowship, calling themselves Unitas Fratrum, or Fratres Unitatis, the United Brethren. From this period to the Reformation they suffered many cruel and vexatious persecutions; yet they preserved their unity, and formed a kind of alliance with the Waldenses, who had for many centuries opposed many of the corrupt practices and doctrines of the Romish church. After the Reformation, they professed to adhere to the Augsburgh Confession, yet they continued a distinct body. After various persecutions and discouragements, during the seventeenth

century, they became in a manner extinct; until about the year 1720, when they began to revive in Bohemia; but as no free toleration could be obtained for them in that country, they agreed to emigrate. Applications were accordingly made to Nicholas Lewis, count of Zinzendorf, who readily granted them permission to settle on his estate in Upper Lusatia. Thither, in 1722, a company of them repaired, and formed the settlement of Herrnhut, from whence they are sometimes called Herrnhutters. Their friend and protector, count Zinzendorf, at length became a convert to the faith and practices of the Moravian Brethren, and commencing preacher, was, in the year 1735, chosen to be their bishop. From this period the sect of the Moravians began to flourish rapidly. Count Zinzendorf was a zealous and enterprising man, though in some respects enthusiastical and mystical. His exertions were of singular service to the cause of the brethren, though his extravagancies sometimes brought them into contempt with the sober and reflecting part of mankind. It is even acknowledged, on the part of the count's friends, that much of the extravagance and absurdity that has been attributed to him owes its origin, or at least its publication, to those persons who wrote his extempore sermons in short-hand, and afterwards published them with all their imperfections about them.

The church of the United Brethren is episcopal, and their church government is conducted with great form and regularity. Questions of dispute are settled by ballot, and in cases of real or supposed importance are often decided by lot. The lot is deemed a solemn appeal to heaven, and is made use of with great seriousness. They have œconomies, or choir-houses, where they live together in community; the single men and single women apart, widows and widowers apart, each under the superintendance of elderly persons of their own class. At Fairfield, near Manchester, there is a Moravian settlement; it is a small village, uncommonly neat and clean, consisting of one large open street, having a handsome chapel, and a small public-house for the reception of strangers who visit the settlement from Manchester and the neighbourhood, particularly on Sundays and other holidays.

The Moravians have also another settlement and school in a very secluded and in some respects romantic situation, at Fulneck, near Leeds; where some men of learning and taste as well as piety have been educated; especially that tender and mournfully exquisite poet James Montgomery.

Christians of this class are very strict in their attention to the youth of both sexes, and never suffer them to come together or to marry without the previous consent of the church; and as the lot must be cast to sanction their union, each receives his partner as a divine appointment. Though the Moravians are united in one body, they are by no means illiberal in their views towards other Christians, who hold what they conceive to be the essentials of religion, and pay divine adoration to Jesus Christ. In doctrine they appear to be inclined to Sabellianism. They address many of their prayers to Jesus as the lamb; and their hymns, being an uncouth translation from the German, often offend the ears of critical persons; especially if their criticism is not softened by the candour of genuine piety. Let their taste and learning, however, be much or little, the Moravians are a very harmless and unoffending people. They appear to be Arminians in opposition to Calvinism, and they reject the use of the term Trinity, and some other popular and unscriptural terms and phrases. In zeal, tempered with modesty, and in silent perseverance in attempting to convert the heathen world to Christianity, the Moravians are unequalled. The Moravian missionaries are quietly and successfully pursuing their labour of love in almost every part of the known world. They have settlements in various parts, particularly in the following places: begun 1732, in the Danish West India Islands; in St. Thomas, New Herrnhut, Nisky; in St. Croix, Friedensburg, Friedenstal; in St. Jan, Bethany, and Emmaus. In 1733, in Greenland, New Herrnhut, Lichtensels, and Lichtenau. In 1734, North America, Fairfield in Upper Canada, and Goshen on the river Muskingum. In 1736, at the Cape of Good Hope, Bavians Kloof. In 1738, in South America, among the negro slaves at Paramaribo and Sommelsdyk; among the free negroes at Bambey, on the Sarameca, and among the native Indians at Hope on the river Corentyn. In 1754, in Jamaica, two settlements in Elizabeth parish. In 1756, in Antigua, at St. John's, Grace hill, and Grace bay. In 1760, near Tranquebar in the East Indies, Brethren's Garden. In 1764, on the coast of Labrador, Nain, Okkak, and Hopedale. In 1765, in Barbadoes, Sharron near Bridgetown. In the same year, in the Russian part of Asia, Sarepta. In 1775, in St. Kitt's, at Basseterre. In 1789, in Tobago, Signal Hill. By the latest accounts published, most of these settlements appear to be in a flourishing state.

Whoever wishes to see a more detailed account of the Moravians will do well to consult Crantz's Ancient and Modern History of the United Brethren, the same author's History of the Mission in Greenland, La Trobe's edition of Spangenburgh's Exposition of Christian Doctrine, also Rimius's Narrative of the Moravians, Bishop Lavington's Moravians compared and detected, and the Periodical Accounts of the Missions of the United Brethren; the latter of which are very interesting not only in a religious, but in a geographical point in view, as they contain the best accounts of the interior of America which have yet been published.

MORAW. See MORAVA.

MORBACH, or MURBACH, a town of France, in the department of Lower Rhine,

42 miles south-east of Strasburg. Lon. 8. 25 E. Lat. 48. 0 N.

MORBEGNO, a town of the country of the Grisons, in the Valteline, where the governor and the regency reside. It is the handsomest and most commercial town in the Valteline, and seated on the Adda, 12 miles S.E. of Chiavenna, and 20 N.E. of Lecco. Lon. 9. 31 E. Lat. 46. 10 N.

MO'RBID. *a.* (*morbidus*, Lat.) Diseased; in a state contrary to health (*Arbuthnot*).

MO'RBIDNESS. *s.* (from *morbid.*) State of being diseased.

MORBI'FICAL. MORBI'FIC. *a.* (*morbus* and *facio*, Lat.) Causing diseases (*Harvey*).

MORBILLI. (*morbillus*, of *morbus*, a disease.) See RUBEOLA.

MORBO'SE. *a.* (*morbosus*, Lat.) Proceeding from disease; not healthy (*Ray*).

MORBO'SITY. *s.* (from *morbosus*, Lat.) Diseased state: not in use (*Brown*).

MORBUS COMITIALIS, a name given to the epilepsy; because if on any day when the people were assembled in *comitia* upon public business, any person suddenly seized with this disorder should fall down, the assembly was dissolved, and the business of the *comitia*, however important, was suspended. See COMITIA.

MORBUS REGIUS, the same with the jaundice. See MEDICINE.

MORBUS, or DISEASE, in botany. See VARIETAS.

MORDA'CIOUS. *a.* (*mordax*, Lat.) Biting; apt to bite.

MORDA'CITY. *s.* (*mordacitas*, Latin.) Biting quality (*Bacon*).

MORDANT. (*mordant*, from *mordre*, to bite, Fr.) An intermede, or substance used in dyeing, to enable the dye or colouring matter to adhere to the material to be coloured, and which it was formerly supposed to do, by biting or eating its way into the texture of such material, whence its name. A better knowledge, however, of the chemical properties of bodies has now taught us that this effect is produced not by any corrosive property in the substance denominated a mordant, but in consequence of its equal attraction or affinity for the colouring material and the material to be coloured, by which they are kept in a state of union. The colours thus requiring to be united by a third substance are denominated adjective; those which possess a natural affinity for the material to be coloured, and of course are capable of adhering to it without any such assistance, are called substantive colours. See for the different kinds of mordants and their mode of action the article DYEING.

MORDELLA. Nibbler. In zoology, a genus of the class insecta, order coleoptera. Antennas moniliform or pectinate; head deflected and bent under the neck; shells curved downwards towards the tip; at the base of the abdomen and towards the thighs is a broad lamina. Thirty-four species; chiefly inhabitants of Europe; a few of Asia, Africa, and America; nine indigenous to our own country, and found on garden-flowers. They may be thus subdivided:

A. Antennas moniliform; fore-feelers clavate, hind-feelers filiform.

B. Antennas pectinate; feelers filiform. The tribe denominated kipiphorus by Fabricius, embracing twelve species.

MO'RDICANT. *a.* (*mordeo*, Lat. *mordicant*, Fr.) Biting; acrid (*Boyle*).

MORDICA'TION. *s.* (from *mordicant.*) The act of corroding or biting (*Bacon*).

MORE. *a.* (mape, Saxon.) 1. In greater quantity; in greater degree (*Shak.*). 2. In greater number (*Cowley*). 3. Greater: not in use (*Acts*). 4. Added to some former number (*Pope*).

MORE. *ad.* 1. To a greater degree (*Bacon*). 2. The particle that forms the comparative degree: as, *more* happy (*Bacon*). 3. Again; a second time (*Tatler*). 4. Longer; yet continuing: with the negative particle; *he lives no* more (*Shakspeare*).

MORE. *s.* 1. A greater quantity; a greater degree (*Shakspeare*). 2. Greater thing; other thing: *he did* more *than his fellows* (*Locke*). 3. Second time; longer time: *he will come no* more (*Pope*.)

MORE (Sir Thomas), lord high chancellor of England, the son of sir John More, knight, one of the judges of the King's-bench, was born in the year 1480, in Milk-street, London. He was first sent to a school at St. Anthony's in Threadneedle-street; and afterwards introduced into the family of cardinal Moreton, who in 1497 sent him to Canterbury college in Oxford. During his residence at the university he constantly attended the lectures of Linacre and Grocinus, on the Greek and Latin languages. Having in the space of about two years made considerable proficiency in academical learning, he came to New-inn in London, in order to study the law; whence, after some time, he removed to Lincoln's-inn, of which his father was a member. Notwithstanding his application to the law, however, being now about twenty years old, he was so bigotted to monkish discipline, that he wore a hair-shirt next his skin, frequently fasted, and often slept on a bare plank. In the year 1503, being then a burgess in parliament, he distinguished himself in the house, in opposition to the motion for granting a subsidy and three fifteenths for the marriage of Henry VII.'s eldest daughter, Margaret, to the king of Scotland. The motion was rejected; and the king was so highly offended at this opposition from a beardless boy, that he revenged himself on Mr. More's father, by sending him on a frivolous pretence to the Tower, and obliging him to pay 111*l.* for his liberty. Being now called to the bar, he was appointed law-reader at Furnival's-inn, which place he held about three years; but about this time he also read a public lecture in the church of St. Lawrence, Old Jury, upon St. Austin's treatise *De civitate Dei*, with great applause. He had indeed formed a design of becoming a Franciscan friar, but

was dissuaded from it; and, by the advice of Dr. Colet, married Jane, the eldest daughter of John Colt, Esq. of Newhall in Essex. In 1508 he was appointed judge of the sheriff's court in the city of London, was made a justice of the peace, and became very eminent at the bar. In 1516 he went to Flanders in the retinue of Bishop Tonstal and Dr. Knight, who was sent by king Henry VIII. to renew the alliance with the archduke of Austria, afterwards Charles V. On his return, cardinal Wolsey would have engaged Mr. More in the service of the crown, and offered him a pension, which he refused. Nevertheless, it was not long before he accepted the place of master of the requests, was created a knight, admitted of the privy-council, and in 1520 made treasurer of the exchequer. About this time he built a house on the bank of the Thames, at Chelsea, and married a second wife. This wife, whose name was Middleton, and a widow, was old, ill-tempered, and covetous; nevertheless Erasmus says he was as fond of her as if she were a young maid.

In the 14th year of Henry VIII. sir Thomas More was made speaker of the house of commons: in which capacity he had the resolution to oppose the then powerful minister, Wolsey, in his demand of an oppressive subsidy; notwithstanding which, it was not long before he was made chancellor of the duchy of Lancaster, and was treated by the king with singular familiarity. The king having once dined with sir Thomas at Chelsea, walked with him near an hour in the garden, with his arm round his neck. After he was gone, Mr. Roper, sir Thomas's son-in-law, observed how happy he was to be so familiarly treated by the king: to which sir Thomas replied, "I thank our lord, son Roper, I find his grace my very good lord indeed, and believe he doth as singularly favour me as any subject within this realm: howbeit, I must tell thee, I have no cause to be proud thereof; for if my head would win him a castle in France, it would not fail to go off." From this anecdote it appears, that sir Thomas knew his grace to be a villain.

In 1526 he was sent, with cardinal Wolsey and others, on a joint embassy to France, and in 1529 with bishop Tonstal to Cambray. The king, it seems, was so well satisfied with his services on these occasions, that in the following year, Wolsey being disgraced, he made him chancellor; which seems the more extraordinary, when we are told that sir Thomas had repeatedly declared his disapprobation of the king's divorce, on which the great *defensor fidei* was so positively bent. Having executed the office of chancellor about three years, with equal wisdom and integrity, he resigned the seals in 1533, probably to avoid the danger of his refusing to confirm the king's divorce. He now retired to his house at Chelsea; dismissed many of his servants; sent his children with their respective families to their own houses (for hitherto he had, it seems, maintained all his children, with their families, in his own house, in the true style of an ancient patriarch); and spent his time in study and devotion: but the capricious tyrant would not suffer him to enjoy his tranquillity. Though now reduced to a private station, and even to indigence, his opinion of the legality of the king's marriage with Anne Boleyn was deemed of so much importance, that various means were tried to procure his approbation; but all persuasion proving ineffectual, he was, with some others, attainted in the house of lords of misprision of treason, for encouraging Elizabeth Barton, the nun of Kent, in her treasonable practices. His innocence in this affair appeared so clearly, that they were obliged to strike his name out of the bill. He was then accused of other crimes, but with the same effect; till, refusing to take the oath enjoined by the act of supremacy, he was committed to the Tower, and, after fifteen months imprisonment, was tried at the bar of the King's-bench for high treason, in denying the king's supremacy. The proof rested on the sole evidence of Rich the solicitor-general, whom sir Thomas, in his defence, sufficiently discredited; nevertheless the jury brought him in guilty, and he was condemned to suffer as a traitor. The merciful Harry, however, indulged him with simple decollation: and he was accordingly beheaded on Tower-hill, on the 5th of July 1535. His body, which was first interred in the Tower, was begged by his daughter Margaret, and deposited in the chancel of the church at Chelsea, where a monument, with an inscription written by himself, had been some time before erected. This monument with the inscription is still to be seen in that church. The same daughter, Margaret, also procured his head after it had remained fourteen days upon London-bridge, and placed it in a vault belonging to the Roper's family, under a chapel adjoining to St. Dunstan's church in Canterbury. Sir Thomas More was a man of learning, and an upright judge; a very priest in religion, yet cheerful, and even affectedly witty. He wanted not sagacity, where religion was out of the question; but in that his faculties were so enveloped, as to render him a weak and credulous enthusiast. He left one son and three daughters; of whom Margaret, the eldest, was very remarkable for her knowledge of the Greek and Latin languages. She married a Mr. Roper of Wellhall in Kent, whose life of sir Thomas More was published by Mr. Hearne at Oxford in 1716. Mrs. Roper died in 1544; and was buried in the vault of St. Dunstan's in Canterbury, with her father's head in her arms.

Sir Thomas was the author of various works, though his Utopia is the only performance that has survived in the esteem of the world; owing to the rest being chiefly of a polemic nature: his answer to Luther has only gained him the credit of having the best knack of any man in Europe at calling bad names in good Latin. His English works were collected and published by order of queen Mary, in 1557; his Latin, at Basil, in

1563; and at Louvain, in 1566. The life of this great man has been written by several persons in the course of the last and present century: very interesting memoirs are given in Dr. Wordsworth's Ecclesiastical Biography.

MORE (Henry), an ingenious English divine, was born at Grantham in Lincolnshire in 1614, and educated first at Eton school, and next at Christ college, Cambridge; where he applied himself to the study of the platonic writers, whose sentiments he strongly imbibed. In 1675, being then D.D. he accepted a prebend in the cathedral of Gloucester, but would never take any higher perferment, though a bishopric was offered him of considerable value. He died in 1687, and was buried in the chapel of Christ college. His philosophical works have been published in one volume folio; and his theological works in another volume folio.

MORE (Alexander), a French protestant divine, was the son of a Scotchman, who was principal of the college at Castres in Languedoc, where this son was born in 1616. He studied at Geneva, and became professor of divinity, and minister at Middleburg, in 1649. He afterwards removed to Amsterdam, where he was chosen professor of history. From Holland he went to France, and was ordained pastor of the reformed church at Paris, where he died in 1670. He published some works, as a Treatise De Gratia et Literis Arbitira; a Reply to Milton's second Defence of the People of England, &c.

MORE (Sir Francis), a learned English lawyer, was a member of the Middle Temple, and died in 1621. His works are, 1. Cases collected and reported, London, 1693, folio. 2. Readings upon 4 Jac. I. in the Middle Temple, folio, 1676.

MORE (John), an English prelate, was born in Leicestershire, and educated at Clare-hall, Cambridge, where he took his degree of D.D. in 1681. After different church preferments, he was consecrated bishop of Norwich in 1691; and translated to Ely in 1707. He died in 1714. His sermons were published by Dr. Samuel Clarke, who was his chaplain. His magnificent library was purchased by George II. for 6000 guineas, and given to the university of Cambridge.

MORE (St. Anthonio), a celebrated painter, was a native of Utrecht, and a disciple of John Schorel. He drew the portraits of several crowned heads, particularly Mary queen of England, wife of Philip II. of Spain. He died at Antwerp in 1575, aged 56.

MOREA, a country of European Turkey, forming a peninsula united to the rest of Greece, by a narrow neck of land, called the Isthmus of Corinth, so famed for the Isthmian games, celebrated there, in honour of Neptune. It was anciently called Peloponnesus, and, in more remote times, Ægialea and Apia. It once consisted of the following small kingdoms: Sicyon, Argos, and Mycene, Corinth, Achaia Proper, Arcadia, and Laconia. Its present name of the Morea is said to be derived from Morus, a mulberry-tree, either from its resembling the leaf of that tree in shape, or from the great number of mulberry-trees it produces. It has not only several rivers, lakes, and mountains, but also many fertile and delightful plains. At the treaty of Carlowitz, the Turks ceded all the Morea to the Venetians, but, in the year 1715, again dispossessed them of it. It is divided into four districts.

MOREL. Phallus esculentus of Linnéus. It grows on moist banks and wet pastures, and springs up in May. It is used in the same manner as the truffle, for gravies and stewed dishes, but gives an inferior flavour. See PHALLUS.

MOREL, or MORELLA CHERRY. See PRUNUS.

MOREL, the name of several learned printers in France. William Morel died at Paris in 1564. Frederic, who was interpreter of the Greek and Latin tongues, and also printer to the king, died in 1583. His son, Frederic Morel, was also a very learned man, and died in 1630, after having printed a great number of valuable authors.

MOREL (Andreas), a famous antiquary, was a native of Bern in Switzerland. He studied medals with intense application, and in 1683 published at Paris a work, entituled Specimen universæ rei nummariæ antiquæ, a second edition of which came out in 1695; but he never completed the work itself. Louis XIV. appointed him to a place in his cabinet, but for some offence or other he was sent to the Bastile, where he remained three years. On his release, he returned to Switzerland, and died there in 1703. In 1734 was published in 2 vols. folio, Thesaurus Morellianus, sive Familiarum Romanarum Numismata omnia, &c. This was part of his grand design above mentioned.

MORELL (Thomas), a learned English divine and lexicographer, was born in 1701, and died in 1784. He edited Ainsworth's Latin Dictionary, Hedericus's Greek Lexicon, and published a useful abridgement of the former work. After his death appeared, Annotations on Locke's Essay, by Dr. Morell, who also selected the scriptures for Handel's Oratorios. (*Watkins*).

MORELY (Lord), an ingenious nobleman, was the son of sir Thomas Parker, in the county of Essex, and a great favourite with Henry VIII. who raised him to the peerage. He contrived to secure that monarch's favour by concurring heartily in his divorce from Catherine, and marriage with Anne Boleyn. He died in 1747. This nobleman wrote several Latin poems.

MOREO'VER. *ad.* (*more* and *over.*) Beyond what has been mentioned; besides (*Shaks.*).

MORES (Edward Rowe), an English antiquary, was born in 1730 at Tunstall in Kent, and educated at Merchant Taylors' school,

from whence he removed to Queen's college, Oxford, where he published a curious remainder of antiquity, entituled, Nomina et Insignia Gentilitia Nobilium Equitumque sub Edwardo primo Rege Militantium, 4to. 1748. In 1752 he was chosen a fellow of the society of antiquaries; and he projected the equitable society for insurance on lives and survivorship by annuities. He was the author of several pieces, particularly the History and Antiquities of Tunstall in Kent, and a Dissertation on Founders and Founderies. He died in 1778.

MORINDA, in botany, a genus of the class pentandria, order monogynia. Flowers aggregate, one-petalled; stigma bifid; drupes aggregate. Three species: two of them East Indian, one a South American tree.

MORINGEN, a town of Suabia, in the principality of Furstenburg, 14 miles N.N.E. of Schaffhausen, and 26 N.W. of Constance. Lon. 3. 46 E. Lat. 47. 48 N.

MORINGEN, a town of Lower Saxony, in the principality of Calenberg, situate on the Mohr, 12 miles N.N.W. of Gottingen. Lon. 9. 49 E. Lat. 51. 40 N.

MORINI, a people of Belgic Gaul, on the shores of the British ocean. The shortest passage into Britain was from their territories. They were called *extremi hominum* by the Romans, because situate on the extremities of Gaul.

MORISON (Robert), physician and professor of botany at Oxford, was born at Aberdeen in 1620, bred at the university there, and taught philosophy for some time in it; but having a strong inclination to botany, made great progress in it. The civil wars obliged him to leave his country; which, however, he did not do till he had first signalized his zeal for the interest of the king, and his courage, in a battle fought between the inhabitants of Aberdeen and the presbyterian troops on the bridge of Aberdeen, in which he received a dangerous wound on the head. As soon as he was cured of it, he went into France; and fixing at Paris, he applied assiduously to botany and anatomy. He was introduced to the duke of Orleans, who gave him the direction of the royal gardens at Blois. He exercised the office till the death of that prince, and afterwards went over to England in 1660. Charles II. to whom the duke of Orleans had presented him at Blois, sent for him to London, and gave him the title of his physician, and that of professor royal of botany, with a pension of 200l. per annum. The Præludium Botanicum, which he published in 1669, procured him so much reputation, that the university of Oxford invited him to the professorship of botany, in 1669; which he accepted, and acquitted himself in it with great ability. He died at London, in 1683, aged 63. He published a second and third part of his History of Plants, in 2 vols. folio; with this title, Plantarum Historia Oxoniensis Universalis. The first part of this excellent work has not been printed; and it is not known what has become of it.

MORISONIA, in botany, a genus of the class monadelphia, order polyandria. Calyx single, bifid; petals four; pistil one; berry pedicelled, one-celled, many-seeded, with a hard bark. One species only; an American tree with oblong, entire, shining coriaceous leaves.

MORLACHIA, a mountainous country in Hungarian Dalmatia, the inhabitants of which are called Morlacks, or Morlacchi. They inhabit the pleasant vallies of Koter, along the rivers Kerka, Cettina, Narenta, and among the inland mountains of Dalmatia. They are said by some to be of Wallachian extraction; but others think their origin involved in the darkness of the barbarous ages. The inhabitants of the seacoast of Dalmatia tell many frightful stories of their avarice and cruelty; but these, abbe Fortis thinks, are all of an ancient date; or, if any such events have happened in later times, they ought rather to be ascribed to the corruption of a few individuals than to the bad disposition of the nation in general. For the most pleasing trait of character among the Morlacchi is friendship. They have even made it a kind of religious article, and tie the sacred bond at the foot of the altar. The Sclavonian ritual contains a particular benediction, for the solemn union of two male or two female friends, in the presence of the congregation. The male friends thus united are called probratimi, and the females posestreme, which mean half-brothers and half-sisters. Friendships between those of different sexes are not bound with so much solemnity, though perhaps in more ancient and innocent ages that was also the custom. From these consecrated friendships among the Morlacchi, and other nations of the same origin, it should seem that the sworn brothers arose, a denomination frequent among the common people in many parts of Europe. If discord happens to arise between two friends among the Morlacchi, it is talked of over all the country as a scandalous novelty; and there have been some examples of it of late years to the great affliction of the old Morlacchi, who attribute the depravity of their countrymen to their intercourse with the Italians.

MORLAIX, a seaport of France, in the department of Finistere, with a castle and a tide harbour. The church of Notre-Dame is a singular structure, and the hospital very handsome. The inhabitants carry on a considerable trade in linen, hemp, and tobacco. It is seated on a river of the same name, 30 miles N.E. of Brest, and 45 W. of St. Brieux. Lon. 3. 46 W. Lat. 48. 33 N.

MO'RLAND. *s.* (morland, Saxon.) A mountainous or hilly country.

MO'RLING. MO'RTLING. *s.* Wool plucked from a dead sheep (*Ainsworth*).

MORLUNDA, a town of Sweden, in the province of Smoland, 41 miles N. of Calmar. Lon. 16. 24 E. Lat. 57. 20 N.

MORMO. *s.* (μορμω.) Bugbear; false terrour.

MORMYRUS, in zoology, a genus of the class pisces, order branchiostega. Head smooth; teeth numerous, notched: aperture of the gills linear, without a cover; gill-membrane with one ray; body scaly. Three species:

1. M. cyprinoides. Tail bifid, appendaged. Inhabits the Nile.

2. M. anguilloides. Tail bifid, obtuse; dorsal fin with twenty-six rays. Inhabits the Nile.

3. M. kannume. Tail bifid, obtuse; dorsal fin with sixty-three rays: body whitish, much compressed. Like the two former, inhabits the Nile.

MORN. *s.* (maрne, Saxon.) The first part of the day; the morning (*Lee*).

MORNAC (Anthony), a French advocate, who was the author of four folio volumes on the subject of law; and also of an octavo volume of poems. He died in 1619.

MORNAY (Philip de), lord of Plessis Marlay, a celebrated French nobleman, was born in 1549, of a noble family. He was bred up by his mother in the protestant persuasion, and studied in several universities, both in France and other countries. In 1576 he went to the court of the king of Navarre, afterwards Henry IV. who received him very courteously, and made him minister of his council. In 1578 he published a treatise on the church; and in the year following began his famous work on the Truth of the Christian Religion. In 1598 he published his book on the Eucharist, which occasioned a conference between him and Du Perron; the result of which was so much in his favour that he was called by many the protestant pope. In 1607 he printed a famous book against popery, entitled, The Mystery of Iniquity, or the History of the Papacy. This great man died at his seat in Poictou, in 1623. He wrote many pieces besides those here mentioned.

MORNE-GAROU, a remarkable volcanic mountain on the island of St. Vincent's in the West Indies. It was visited by Mr. James Anderson, surgeon, in the year 1784, who is the only person that ever ascended to the top of it, and whose account of it is published in the Philosophical Transactions, vol. 75, or New Abridgment, vol. 60. p. 634.

MO'RNING. *s.* The first part of the day, from the first appearance of light to the end of the first fourth part of the sun's daily course.

MO'RNING. *a.* Being in the early part of the day (*Pope*).

MORNING-GOWN. *s.* A loose gown worn before one is formally dressed (*Addison*).

MORNING-STAR. *s.* The planet Venus when she shines in the morning (*Spenser*). Astronomers reckon morning, *mane*, from the time of midnight to that of mid-day or noon.

MOROC, in ornithology. See CUCULUS INDICATOR.

MOROCCO, an empire of Africa, comprehending a considerable part of the ancient Mauritania, lying between 28 and 36° N. lat. It is bounded on the W. by the Atlantic, on the E. by the river Muliva, which separates it from Algiers, on the N. by the Mediterranean, and on the S. by mount Atlas. Its greatest length, from N.E. to S.W. is above 590 miles, and, where widest, not more than 260 broad. The south part of the empire contains the kingdoms of Sus, Tarudan, Morocco Proper, Tasilet, and Sugelmessa; and the north part those of Fez and Mequinez. The air of this country is pretty temperate, especially near mount Atlas. The soil, though sandy and dry in some places, is fertile in others; and the fruits, as well as the pastures, are excellent, but the country is not properly cultivated. The inhabitants are Mahometans, of a tawny complexion, robust, and very skilful in managing a horse, and wielding a lance: they are jealous, deceitful, superstitious, and cruel. There are two sorts of inhabitants; the Arabs, who dwell in moveable villages, composed of about 100 tents, and the Bereberies, who are the ancient inhabitants, and live in cities and towns. There are a great number of christian slaves, and some merchants, upon the coast, beside a multitude of Jews, who carry on almost all the trade; especially by land with the negroes, to whom they send large caravans, which travel over vast deserts, almost destitute of water. They carry with them woollen goods, silk, salt, &c. and in return have slaves, gold, and elephants teeth. They also send large caravans to Mecca every year, partly out of devotion, and partly for trade, consisting of several thousand camels, horses, and mules. Besides woollen goods, their commodities are Morocco leather, indigo, cochineal, and ostrich feathers; in return for which they have silks, muslins, calicoes, coffee, and drugs. In the deserts are lions, tigers, leopards, and serpents of several kinds. The fruits are dates, figs, almonds, lemons, oranges, pomegranates, and many others. There is also flax, and hemp, but little timber. The emperor is absolute, his will being a law, and he often exercises great cruelties. His naval force consists chiefly of rovers, who now and then take large prizes. He can bring 100,000 men into the field, nearly half of which are horse; but the whole are poorly armed, and know little of the art of war.

MOROCCO, a city of Africa, and capital of the empire so called, situated in a pleasant plain, planted with palm-trees, having Mount Atlas to the east. The city of Morocco itself, exposed to the devastations of different conquerors, has preserved nothing but its form. The extent of the walls, which still exist entire, except in some few places, supposes a city which might contain 300,000 souls: at present this capital is little better than a desert. The ruins of houses, heaped one upon another, serve only to harbour thieves, who lurk among them to rob the passengers. The quarters which have been rebuilt are considerably distant from each other; and the houses are low, dirty, and extremely inconvenient. Mr. Chenier doubts whether it contains 30,000 inhabitants, even when the court is there.

Morocco possesses several large mosques, but they have no pretensions to magnificence. Within the walls are a number of large inclosed spaces, almost entirely detached, containing gardens of orange-trees, and pavilions, in which the princes lodge. Among the number of the public edifices at Morocco we must not forget to mention the Elcaisseria, a place where stuffs and other valuable commodities are exposed to sale. At the extremity of the city of Morocco, and very near the palace, is the quarter of the Jews, inclosed by walls near two miles round, where the Jews reside, under the guard of an alcaid, to protect them from insult. This same quarter was formerly the residence of the Spanish nobles, or others of that nation, who, from discontent, or other motives, entered into the service of the kings of Morocco; and there is still a part of the city, called the quarter of Andalusia. Not less than 3000 Jewish families formerly resided here, as may be estimated by the ruins of houses and synagogues. Of this great number there at present scarcely remain 200 families, exposed to tyranny and poverty. The emperor's palace, at the extremity of the city of Morocco, fronting Mount Atlas, is a very extensive and solid building. The principal gates are Gothic arches of cut stone, embellished with ornaments in the Arabian taste. Within the walls are various courts and gardens, elegantly laid out by European gardeners. Lon. 6. 45 W. Lat. 31. 12 N.

Morocco, or Marroquin the skin of a goat, or some other animal resembling it, dressed in sumac or galls, and coloured of any colour at pleasure; much used in book-binding, &c. The name is ordinarily derived from the kingdom of Morocco, whence it is supposed the manner of preparing these skins was first borrowed. We have Morocco skins brought from the Levant, Barbary, Spain, Flanders, and France; red, black, yellow, blue, &c. For the manner of preparing them, see Leather.

Morocco reed, in botany. See Adonis.

MORO'SE. *a.* (*morosus*, Latin.) Sour of temper; peevish; sullen (*Watts*).

MORO'SELY *ad.* Sourly; peevishly (*Government of the Tongue*).

MORO'SENESS. *s.* (from *morose.*) Sourness; peevishness (*Watts*).

MOR'OSIS (*morosis*, μώρωσις, from μωρος, folly.) See Amentia.

MORO'SITY. *s.* (*morositas*, Latin.) Moroseness; sourness; peevishness (*Clarendon*).

MORPETH, a town of England, in the county of Northumberland, situated on the north side of the river Wansbeck, though the parish is on the south side. It has a weekly market on Wednesday, said to be the largest in England for cattle, except Smithfield. It is governed by two bailiffs, aldermen, &c. and sends two members to the British parliament. In the reign of king John, the town was burned by the inhabitants, out of hatred to that monarch. It had anciently a castle, now in ruins: ninety-one miles S. Edinburgh, and 287 N. London. Lon. 1. 38 W. Lat. 55. 15 N.

MORPHEUS, in mythology, a minister of the god Somnus, who naturally imitated the grimaces, gestures, words, and manners of mankind. He is sometimes called the god of sleep. He is generally represented as a sleeping child of a great corpulence, and with wings. He holds a vase in one hand, and in the other are some poppies.

MORPHEW, a scurf on the face.

MORRERI (Lewis), author of the Historical Dictionary, was born at Barge-mont in Province, 1643. He learned rhetoric and philosophy at Aix, and divinity at Lyons. At 18 years of age he wrote a small piece, intitled Le Pays d'Amour, and a collection of the finest French poems intitled Doux plaisirs de la Poesie. He learned Spanish and Italian; and translated out of Spanish into French the book intitled La Perfection Chretienne de Rodiguez. He then refined the Saints Lives to the purity of the French tongue. Being ordained priest, he preached at Lyons, and undertook, when he was about 30 years of age, a new Historical Dictionary, printed at Lyons in one vol. folio, 1673. But his continual labour impaired his health; so that he died in 1680, aged 37. His second volume was published after his death; and four more volumes have since been added. He left some other works behind him.

MORRIS, in ichthyology. See Septocephalus.

Morris dancers. See Moresqe.

MORROW. *s.* (moꞃgen, Saxon.) 1. The day after the present day (*Cowley*). 2. To Morrow. On the day after this current day (*Prior*).

MORS, Death, one of the infernal deities, born of Night without a father. She was worshipped by the ancients with great solemnity. She was not represented as an actually existing power, but as an imaginary being. Euripides introduces her in one of his tragedies on the stage. The moderns represent her as a skeleton armed with a scythe and a scymetar.

MORSE, in mastiology. See Trichecus.

MO'RSEL. *s.* (*morsellus*, low Latin.) 1. A piece fit for the mouth; a mouthful (*Shakspeare*). 2. A piece; a meal (*L'Estrange*). 3. A small quantity: not proper (*Boyle*).

MO'RSURE. *s.* (*morsure*, Fr. *morsura*, Lat.) The act of biting.

MORT. *s.* (*morte*, French.) 1. A tune sounded at the death of the game (*Shakspeare*). 2. (*morgt*, Islandick.) A great quantity.

MORTAGNE, a town of France, in the department of Orne, famous for its serges and tanneries. It is 19 miles east of Seez, and 70 west of Paris. Lon. 0. 40 E. Lat. 48. 33 N.

Mortagne, a town of France, in the department of the North, seated at the confluence of the Scarpe and Scheldt, eight miles S. E. of Tournay. Lon. 3. 30 E. Lat. 50. 29 N.

MORTAIN, a town of France, in the department of the Channel, seated on the rivulet Lances, almost surrounded by craggy rocks, 20

miles east of Avranches. Lon. 0. 54 W. Lat. 48. 37 N.

MO'RTAL. *a.* (*mortalis*, Latin.) 1. Subject to death; doomed sometime to die. 2. Deadly; destructive (*Bacon*). 3. Bringing death (*Pope*). 4. Human; belonging to man (*Milton*). 5. Extreme; violent (*Dryden*).

Mo'rtal. *s.* Man; human being (*Tickel*).

MORTA'LITY. *s.* (from *mortal.*) 1. Subjection to death; state of a being subject to death (*Watts*). 2. Death (*Shakspeare*). 3. Power of destruction (*Shakspeare*). 4. Frequency of death (*Graunt*). 5. Human nature (*Pope*).

Mortality (Bills of), are accounts or registers specifying the numbers born, married, and buried in any parish, town, or district. In general they contain only these numbers; and, even when thus limited, are of great use, by showing the degrees of healthiness and prolificness, and the progress of population in the places where they are kept. It is therefore much to be wished, that such accounts had been always correctly kept in every kingdom, and regularly published at the end of every year. We should then have had under our inspection the comparative strength of every kingdom, as far as it depends on the number of inhabitants, and its increase or decrease at different periods. But such accounts are rendered more useful, when they include the ages of the dead, and the distempers of which they have died. In this case they convey some of the most important instructions, by furnishing us with the means of ascertaining the law which governs the waste of human life, the values of annuities dependent on the continuance of any lives, on any survivorships between them, and the favourableness or unfavourableness of different situations to the duration of human life. There are but few registers of this kind; nor has this subject, though so interesting to mankind, ever engaged much attention till lately. Bills containing the ages of the dead well known are those for the town of Breslaw in Silesia. It is well known what use has been made of these by Dr. Halley, and after him by De Moivre. A table of the probabilities of the duration of human life at every age, deduced from them by Dr. Halley, has been published in the Philosophical Transactions, (see the abridgement, vol. iii. p. 669.) and is the first table of this sort that has been ever published. Since the publication of this table, similar bills have been established in a few towns of this kingdom; and particularly in London, in the year 1728, and at Northampton, in 1735. See Life.

Two improvements of these registers have been proposed: the first is, that the sexes of all that die in every period of life should be specified in them, under the denomination of boys, married men, widowers, and bachelors; and of girls, married women, widows, and virgins. The second is, that they should specify the numbers of both sexes dying of every distemper in every month, and at every age. See the end of the 4th essay in Dr. Price's treatise on reversionary payments. Registers of mortality thus improved, when compared with records of the seasons, and with the circumstances that discriminate different situations, might contribute greatly to the increase of medical knowledge; and they would afford the necessary data for determining the difference between the duration of human life among males and females.

The establishment of bills of mortality in Great Britain originated in the frequent appearance of the plague, which formerly made great devastations in this country, and an abstract of the number of deaths was published weekly, to shew the increase or decrease of the disorder, that individuals might not be exposed to unfounded alarms, but have some means of judging of the necessity of removal, or of taking other precautions, and government be informed of the propriety or success of any public measures relating to the disorder. Since the disappearance of the plague, these registers have been continued from the convenience found in ascertaining by them the precise time of the birth or death of individuals, and for the information they furnish respecting the rate of human mortality, and the state of population.

The first directions for keeping parish registers of births and burials were given in 1538, when Thomas Cromwell was appointed the king's vicegerent for ecclesiastical jurisdiction, and in that capacity issued certain injunctions to the clergy, one of which ordains, that every officiating minister shall, for every church, keep a book, wherein he shall register every marriage, christening, and burial; and the injunction goes on to direct the manner and time of making the entries in the register book weekly, any neglect of which is made penal. In 1547 all episcopal authority was suspended for a time, while the ecclesiastical visitors then appointed went through the several dioceses to enforce divers injunctions, among which was that respecting parish registers. This injunction was again repeated in the beginning of the reign of Elizabeth, who also appointed a protestation to be made by the clergy, in which, among other things, they promised to keep the register-book in a proper manner. One of the canons of the church of England prescribes very minutely in what manner entries are to be made in the parish registers, and orders an attested copy of the register of each successive year to be annually transmitted to the bishop of the diocese to be preserved in the bishop's registry. This canon also contains a retrospective clause, appointing that the ancient registers, so far as they could be procured, but especially since the beginning of the reign of Elizabeth, should be copied into a parchment book, to be provided by every parish; which regulation was so well obeyed, that most of the ancient parish registers now extant commence with that queen's reign, and some of them earlier, quite as far back as the date of the original injunction.

The London bills of mortality are founded upon the reports of the sworn searchers, who view the body after decease, and deliver their report to the parish clerk. The parish clerks are required, under a penalty for neglect, to make a weekly return of burials, with the age and disease of which the person died; a summary of which account is published weekly; and on the Thursday before Christmas-day, a general account is made up for the whole year. These general accounts of christenings and burials taken by the company of parish clerks of London were began December 21, 1592; and in 1594 the weekly account was first made public, as also the general or yearly account, until December 18, 1595, when they were discontinued upon the ceasing of the plague; in 1603 they were resumed, and have been regularly continued ever since. The original bills comprehended only 109 parishes, but se-

veral others were afterwards included, and in 1660 the bills were new modelled, the twelve parishes in Middlesex and Surry being made a division by themselves, as were likewise the five parishes in the city and liberties of Westminster. Several other parishes have been added to them at subsequent periods, but many of them have been merely new parishes formed out of larger ones which were before included, and the total number of parishes now comprehended in the London bills of mortality is 146. They are divided into the ninety-seven parishes within the walls, sixteen parishes without the walls, twenty-three out-parishes in Middlesex and Surry, and ten parishes in the city and liberties of Westminster. They give the ages at which the persons die, and a list of the diseases and casualties by which their death was occasioned; but little dependence can be placed on the list of diseases, except with respect to some of the most common and determinate.

From the last bill of mortality for the year, from Dec. 11, 1809, to Dec. 11, 1810, we learn that in

	Christened.	Buried.
The 97 parishes within the walls	1004	1388
17 parishes without the walls	4258	4129
23 out parishes	10,503	9535
10 parishes in Westminster	4165	4841

Diseases and casualties this year.

Abortive and stilborn	574	Head-ach	1
Abscess	42	Horshoehead	1
Aged	1532	Imposthume	2
Ague	5	Inoculation	1
Apoplexy and suddenly	234	Jaundice	31
Asthma and phthisic	674	Jaw-locked	2
Bedridden	1	Inflammation	676
Bile	4	Livergrown	31
Bleeding	36	Lunatic	193
Bursten and rupture	22	Measles	1031
Cancer	77	Miscarriage	3
Canker	1	Mortification	181
Childbed	183	Palsy	99
Colds	16	Pleurisy	28
Colick, Gripes, &c.	6	Quinsy	6
Consumption	5427	Rheumatism	6
Convulsions	3860	Scurvy	4
Cough and hooping-cough	419	Small pox	1198
Cramp	3	Sore throat	6
Croup	97	Sores and ulcers	9
Diabetes	1	Spasm	22
Dropsy	771	St. Anthony's fire	2
Evil	5	Stoppage in the stomach	12
Fatigue	1	Swelling	1
Fevers of all kinds	1139	Teeth	438
Fistula	5	Thrush	55
Flux	10	Vomiting and looseness	1
French pox	29	Water in the chest	7
Gout	36	Water in the head	243
Gravel, stone, strangury	16	Worms	9
Grief	5		

Bruises	2	Killed themselves	28
Burnt	47	Murdered	4
Choaked	2	Overlaid	1
Drowned	124	Poisoned	2
Excessive drinking	7	Scalded	3
Executed	6	Starved	1
Found dead	20	Suffocated	8
Fractured	3		
Frighted	3	Total	338
Killed by falls and several other accidents	72		

Christened { Males - - - 10,188 } In all 19,930
{ Females - - 9742 }

Buried { Males - - - 10,441 } In all 19,893
{ Females - - 9482 }

Whereof have died,

Under two years of age	5853	Fifty and sixty	1648
Between two and five	2430	Sixty and seventy	1587
Five and ten	850	Seventy and eighty	1262
Ten and twenty	695	Eighty and ninety	473
Twenty and thirty	1818	Ninety and a hundred	79
Thirty and forty	1788	A hundred and five	1
Forty and fifty	2018		

Increased in the burials this year 3213.

These bills would afford the means of ascertaining the state of population with sufficient precision, if the proportion of annual deaths to the number of the living could be accurately determined. This, however, previous to the enumeration of 1801, could not be easily found even in the metropolis, the population of which, as deduced from the bills of mortality, was very differently stated by different writers. Mr John Graunt, who first published observations on the London bills of mortality in the year 1662, made the proportion dying annually about 1 in 27; sir William Petty and Dr Brakenridge afterwards stated it as 1 in 30, and Mr. Maitland 1 in 24½; but Dr. Price, who bestowed much attention on this subject, has shewn that about the year 1769, at least 1 in 22½ of all the inhabitants of London died annually. In fact the proportion appears to have varied considerably at different periods, and of late years, in consequence of the houses being less crowded with inhabitants, the widening of streets, and other improvements, the metropolis has become more healthy, and consequently the proportion dying annually less than formerly. In the Observations on the Results of the Population Act, it is stated that the proportion of annual deaths in London in the year 1750 appears to have been 1 in 23, and in the year 1801 only 1 in 31

The following statement of the average of each five years from 1730 will shew a considerable decrease in the annual number of burials, and an increase of the christenings, which strongly indicate the progressive increase of the population of the metropolis; the proportion of annual deaths to 100 christenings likewise shews that they have approached so nearly to an equality, that the population of London can now nearly support itself without an annual supply from the country.

5 Years ending	Burials.	Christenings.	Proportion to 100 Christen.
1735	25,490	17,517	145
1740	27,494	16,144	170
1745	25,350	14,419	175
1750	25,352	14.496	174
1755	21,080	15.119	139
1760	19,837	14,459	137
1765	23,992	15,931	150
1770	22.888	16,440	139
1775	22,177	17,284	128
1780	20.743	17,256	120
1785	18.880	17,263	109
1790	19,657	18,465	106
1795	20,928	18,800	107
1800	19,131	18,708	102

The bills of mortality in many parts of Great Britain are known to be materially defective; the deficiencies are ascribed chiefly to the following circumstances 1. Many congregations of dissenters inhabiting towns have their own peculiar burying grounds; as have likewise the Jews, and the Roman Catholics who reside in London. 2. Some persons, from motives of poverty or convenience, inter their dead without any religious ceremony; this is known to happen in the metropolis, in Bristol, and Newcastle-upon-Tyne, and may happen in a few other large towns. 3. Children who die before baptism are interred without any religious ceremony, and consequently are not registered. 4. Many persons employed in the army and in navigation die abroad, and consequently their burials remain unregistered. 5. Negligence may be supposed to cause some omissions in the registers, especially in those small benefices where the officiating minister is not resident. Whatever may be the total number of deaths and burials, which from these several circumstances are not brought to account, it has been estimated that about 5000 of them may be attributed to the metropolis, and a large portion of the rest may be ascribed to the other great towns, and to Wales, where the registers are less carefully kept than in England. In Scotland registers of mortality have not yet been generally established; and those which are kept are in many instances very incomplete.

The total annual amount of burials, as collected pursuant to the population act, authorizes a satisfactory inference of diminishing mortality in England since the year 1780; the number of marriages and baptisms indicates that the existing population of 1801, was to that of 1780, as 117 to 100, while the amount of registered burials remained stationary during the same period, as will be seen in the following account.

Total number of burials in England and Wales.

Years.	Males.	Females.	Total.
1700	65,752	66,976	132,728
1710	70,606	69.702	140,308
1720	81,156	79,268	160,424
1730	89,085	87,408	176,493
1740	83,706	83,267	166.973
1750	77,149	77,537	154,686
1760	77,750	77,887	155,637
1770	85,952	88,431	174,383
1780	95,845	95,891	191,736
1781	94,505	94,867	189,372
1782	90,189	90,725	180,914
1783	90 606	91,383	181,989
1784	92.851	95,070	187,921
1785	91 548	93,922	185,470
1786	88.330	90,728	179,058
1787	88,123	90,595	178,718
1788	89,227	92 118	181,345
1789	88,411	90,973	179,384
1790	87,954	90,777	178,731
1791	90 895	89,557	180,452
1792	90,963	91,646	182,609
1793	98,560	98,305	196,865
1794	95.511	95,638	191,149
1795	102,086	101,242	203,328
1796	92,289	92,245	184,534
1797	92,292	92,637	184,929
1798	90,657	90,656	181,313
1799	92,078	91,189	183,267
1800	101,686	99,442	201,128

Total number of baptisms and of burials in the twenty-nine years above specified.

	Males.	Females.	Total.
Baptisms	3,285,188	3,150,922	6,436,110
Burials	2,575,762	2,590,082	5,165,844

The proportion of births, therefore, appears to be 104¼ males to 100 females; of the deaths 99½ males to 100 females. The average number of burials during the last twenty-one years was about 186,000 per annum. See LIFE.

MO'RTALLY. *ad.* (from *mortal*) 1. Irrecoverably; to death (*Dryden*). 2. Extremely; to extremity (*Granville*).

MO'RTAR. *s.* (*mortarium*, Latin.) 1. A vessel in which materials are broken by being pounded with a pestle (*Ray*). 2. A short wide cannon out of which bombs are thrown (*Granville*).

MORTAR. *s.* (*morter*, Dutch; *mortier*, Fr.) Cement made of lime and sand with water, and used to join stones or bricks (*Mortimer*).

The proportions of lime and sand usually employed in making the common mortar, are two parts of the former to three of the latter, which are mixed up with soft water; but its quality and durability will, according to Dr. Anderson, be considerably improved, if the lime be slaked, and the sand mixed up with lime-water, instead of the common. The reason assigned for this opinion is, that the fluid drawn from wells contains a large portion of fixed air; which, by mingling with the mortar, before it is used, reduces the quick-lime into a kind of inert calcareous earth, similar to chalk, and thus spoils the cement. But, if the mortar be worked up in a perfectly caustic state, it attracts the air so slowly, that it concretes into a kind of stony matter, which, in the course of time, becomes as hard as the rock from which the lime-stone was taken.

In the year 1777 was published (in French), an ingenious Inquiry concerning the Manner in which the Romans prepared the Lime they used in Building; as also on their Method of mixing and using their Mortar; by M. de Lafaye. The principal circumstance appears to be the mode of slaking the lime without liquefying it, so as to reduce it to powder; and at the same time to leave it sufficiently caustic to yield to strong mortar; which, in proportion to its age, will acquire additional strength.—To effect such object, it is requisite to select good fresh lime, made of hard lime-stone, which is to be broken into pieces of the size of an egg. These should be placed in a shallow open basket, which ought to be plunged into water till the surface of the fluid begin to boil. The basket is then drawn out, and suffered to drain for a short time; after which the lime is put into casks, where it speedily grows hot, and crumbles into powder.

The lime thus prepared is to be mixed with various compositions of mortar, according to the purposes for which they are designed. It may be preserved for a considerable time, and will retain its useful properties by simply covering the casks with straw. M. Guyton de Morveau states, in a late volume of the Annales de Chimie, that he employed this lime, 18 years since, in the construction of a small aqueduct, which was intended to convey water to an artificial nitre-bed. The mortar consisted of equal parts of the following three ingredients, namely, sand, fragments of calcareous stone, and lime slaked according to the directions above given: in a short time it acquired an uncommon degree of firmness, which has remained unimpaired since that period.

This chemist has likewise given the following proportions for good mortar:

Fine sand - - -	30
Cement of well-baked bricks -	30
Slaked lime - - -	20
Unslaked lime - - -	20
	100

MORTAR, a chemical utensil very useful for the division of bodies, partly by percussion and partly by grinding. Mortars have the form of an inverted bell. The matter intended to be pounded is to be put into them, and there it is to be struck and bruised by a long instrument called a pestle. The motion given to the pestle ought to vary according to the nature of the substances to be pounded. Those which are easily broken, or which are apt to fly out of the mortar, or which are hardened by the stroke of the pestle, require that this instrument should be moved circularly, rather by grinding or bruising than by striking. Those substances which are softened by the heat occasioned by rubbing and percussion, require to be pounded very slowly. Lastly, those which are very hard, and which are not capable of being softened, are easily pounded by repeated strokes of the pestle. They require no bruising but when they are brought to a certain degree of fineness. But these things are better learned by habit and practice than by any directions.

As mortars are instruments which are constantly used in chemistry, they ought to be kept of all sizes and materials; as of marble, copper, glass, iron, gritstone, and agate. The nature of the substance to be pounded determines the choice of the kind of mortar. The hardness and dissolving power of that substance are particularly to be attended to. As copper is a soft metal, soluble by almost all menstruums, and hurtful to health, good artists have some time ago proscribed the use of this metal.

One of the principal inconveniences of pulverisation in a mortar proceeds from the fine powder which rises abundantly from some substances during the operation. If these substances be precious, the loss will be considerable; and if they be injurious to health, they may hurt the operator. These inconveniences may be remedied, either by covering the mortar with a skin, in the middle of which is a hole, through which the pestle passes; or by moistening the matter with a little water when this addition does not injure it; or, lastly, by covering the mouth and nose of the operator with a fine cloth, to exclude this powder. Some substances, as corrosive sublimate, arsenic, calxes of lead, cantharides, euphorbium, &c. are so noxious that all these precautions ought to be used, particularly when a large quantity of them is pounded.

Large mortars ought to be fixed upon a block of wood so high that the mortar shall be level with the middle of the operator. When the pestle is large and heavy, it ought to be suspended by a cord or chain fixed to a moveable pole, placed horizontally above the mortar: this pole considerably relieves the operator, because its elasticity assists the raising of the pestle.

MORTAR-PIECE, in the military art, a short piece of ordinance, thick and wide, proper for throwing bombs, carcases, shells, stones, bags filled with grape-shot, &c. See GUNNERY.

MORTARS (Land), are those used in sieges, and of late in battles, mounted on beds made of solid timber, consisting generally of four pieces, those of the royal and cohorn excepted, which are but one single block; and both mortar and bed are transported on block-carriages. There is likewise a kind of land-mortars mounted on travelling carriages, invented by count Buckeburg, which may be elevated to any degree; whereas ours are fixed to an angle of 45 degrees, and firmly lashed with ropes. The following table shows the weight of land-mortars and shells; together with the quantity of powder the chambers hold when full; the weight of the shells, and powder for loading them.

Diameter of mortars.	13-inch.	10-inch.	8-inch.	5-8 inch royal.	4-6 inch cohorn.
Mortar's weight.	C. qr. lb. 25 0 0	C. qr. lb. 10 2 18	C. qr. lb. 4 0 20	C. qr. lb. 1 1 0	C. qr. lb. 0 3 0
Shell's weight.	1 2 15	0 2 25	0 1 15	0 0 12	0 0 7
Shell's cont. of powder.	lb. oz. gr. 9 4 8	lb. oz. gr. 4 14 12	lb. oz. gr. 2 3 8	lb. oz. gr. 1 1 8	lb. oz. gr. 0 8 0
Chamber's cont. of powder.	9 1 8	4 0 0	2 0 10	1 0 0	0 8 0

MORTARS (Sea), are those which are fixed in the bomb-vessels for bombarding of places by sea: and as they are generally fired at a much greater distance than that which is required by land, they are made somewhat longer and much heavier than the land-mortars. The following table exhibits the weight of the sea-mortars and shells, and also of their full charges.

Nature of the mortar.	Powder contained in the chamber when full.	Weight of the mortar.	Weight of the shell when fixed.	Weight of powder contained in the shell
	lb. oz.	C. qr. lb.	lb.	lb. oz.
10-inch howitzer.	12 0	31 2 26		
13-inch mortar.	30 0	81 2 1	198	7 0
10-inch mortar.	12 0	34 2 11	93	

To charge or load a Mortar, the proper quantity of gun-powder is put into the chamber, and if there be any vacant space they fill it up with hay: some choose a wooden plug; over this they lay a turf, some a wooden tampion fitted to the bore of the piece; and lastly the bomb; taking care that the fuse be in the axis thereof, and the orifice be turned from the muzzle of the piece: what space remains is to be filled up with hay, straw, turf, &c. so as the load may not be exploded without the utmost violence.

The quantity of gun-powder to be used is found by dividing the weight of the bomb by 30; though this rule is not always to be strictly observed.

When the proper quantity of powder necessary to charge a sea-mortar is put into the chamber, it is covered with a wad well beat down with the rammer. After this the fixed shell is placed upon the wad, as near the middle of the mortar as possible, with the fuse-hole uppermost, and another wad pressed down close upon it, so as to keep the shell firm in its position. The officer then points the mortar according to the proposed inclination. When the mortar is thus fixed, the fuse is opened; the priming-iron is also thrust into the touch-hole of the mortar to clear it, after which it is primed with the finest powder. This done, two of the matrosses or sailors, taking each one of the matches, the first lights the fuse, and the other fires the mortar. The bomb, thrown out by the explosion of the powder, is carried to the place intended: and the fuse, which ought to be exhausted at the instant of the shell's falling, inflames the powder contained in it, and bursts the shell in splinters; which, flying off circularly, occasion incredible mischief wheresoever they reach.

If the service of mortars should render it necessary to use pound-shots, 200 of them with a wooden bottom are to be put into the 13-inch mortar, and a quantity of powder not exceeding 5 pounds; and 100 of the above shot with 2½ pounds of powder, for the 10-inch mortar, or three pounds at most.

To elevate the Mortar, so as its axis may make any given angle with the horizon, they apply the artillery-level or gunner's quadrant. An elevation of 70 or 80 degrees is what is commonly chosen for rendering mortars most serviceable in casting shells into towns, forts, &c. though the greatest range be at 45 degrees.

All the English mortars are fixed to an angle of 45 degrees, and lashed strongly with ropes at that elevation. Although in a siege there is only one case in which shells should be thrown with an angle of 45 degrees; that is, when the battery is so far off that they cannot otherwise reach the works: for when shells are thrown out of the trenches into the works of a fortification, or from the town into the trenches, they should have as little elevation as possible, in order to roll along, and not bury themselves; whereby the damage they do, and the terror they occasion, are much greater than if they sink into the ground. On the contrary, when shells are thrown upon magazines or any other buildings with an intention to destroy them, the mortars should be elevated as high as possible, that the shells may acquire a greater force in their fall, and consequently do greater execution.

If all mortar pieces were, as they ought to be, exactly similar, and their requisites of powder as the cubes of the diameters of their several bores, and if their shells, bombs, carcases, &c. were also similar; then, comparing like with like, their ranges on the plane of the horizon, under the same degree of elevation, would be equal; and consequently one piece being well proved, i. e. the range of the grenado, bomb, carcase, &c. being found to any degree of elevation, the whole work of the mortar-piece would become very easy and exact.

But since mortars are not thus similar, it is required that the range of the piece, at some known degree of elevation, be accurately found by measuring; and from hence all the other ranges may be determined.

Thus, to find the range of the piece at any other elevation required: say, As the sine of double the angle under which the experiment was made, is to

N 2

the sine of double the angle proposed, so is the range known to the range required.

MORTARA, a strong town of Italy, in the Milanese, subject to the king of Sardinia. It is 15 miles N.E. of Casal, and 22 S.W. of Milan. Lon. 8. 40 E. Lat. 45. 22 N.

MORTGAGE, in law, an obligation, whereby lands or tenements of a debtor are pawned or bound over to the creditor for money, or other effects borrowed; peremptorily to be the creditor's for ever, if the money be not repaid at the day agreed on.

In this sense, *mortgage*, in the common law, amounts to much the same with *hypotheca*, in the civil law.

The creditor holding such land, on such agreement, is in the mean time called tenant at mortgage. He who lays the pawn or gage is called the mortgager; and he that takes it the mortgagee. If a mortgage incluoe excessive usury, it is prohibited by a statute 37 Hen. VIII.

The French sometimes use the word mortgage in the same sense in their language, where it stands in contradistinction to a simple contract, which does not carry with it the mean profits, and which they call *vif-gage*, life-pledge.

Glanville defines mortgage, *mortuum vadium*, to be that *cujus fructus vel reditus interim percepti in nullo se acquietant*. Thus, it is called mortgage, i. e. dead gage, of *mort*, death, and *gage*, pledge; because whatever profit it yields, yet it redeems not itself by yielding such profit, except the whole sum borrowed be likewise paid at the day; the mortgager being by covenant to receive the profits till default of payment. Others hold it called mortgage, because, if the money be not paid at the day, the land, *moritur*, dies to the debtor, and is forfeited to the creditor.

The last and best improvement of mortgages seems to be, that in the mortgage-deed of a term for years, or in the assignment thereof, the mortgageor should covenant for himself and his heirs, that if default is made in the payment of the money at the day, then he and his heirs will, at the costs of the mortgagee and his heirs, convey the freehold and inheritance of the mortgaged lands to the mortgagee and his heirs, or to such person or persons (to prevent merger of the term) as he or they shall direct and appoint. for the reversion, after a term of fifty or a hundred years, being little worth, and yet the mortgagee for want thereof continuing but a termer, and subject to a forfeiture, &c. and not capable of the privileges of a freeholder; therefore when the mortgageor cannot redeem the land, it is but reasonable the mortgagee should have the whole interest and inheritance of it to dispose of it as absolute owner. 3 Bac. Abr. 633.

Although after breach of the condition, an absolute fee-sipmle is vested at common law in the mortgagee; yet a right of redemption being still inherent in the land, till the equity of redemption is foreclosed, the same right shall descend to, and is invested in, such persons as had a right to the land, in case there had been no mortgage or incumbrance whatsoever; and as an equitable performance as effectually defeats the interests of the mortgage as the legal performance does at common law, the condition still hanging over the estate till the equity is totally foreclosed; on this foundation it has been held that a person who comes in under a voluntary conveyance may redeem a mortgage; and though such right of redemption is inherent in the land, yet the party claiming the benefit of it must not only set forth such right, but also shew that he is the person entitled to it. Hard. 465.

But if a mortgage is forfeited, and thereby the estate absolutely vested in the mortgagee at common law, yet a court of equity will consider the real value of the tenements, compared with the sum borrowed. And if the estate is of greater value than the sum lent thereon, they will allow the mortgageor, at any reasonable time, to recal or redeem the estate, paying to the mortgagee his principal, interest, and costs. This reasonable advantage, allowed to the mortgageors, is called the equity of redemption. 2 Black. 159.

It is a rule established in equity, analogous to the statute of limitation, that after twenty years possession of the mortgagee he shall not be disturbed, unless there are extraordinary circumstances; as in the case of femes covert, infants, and the like. 3 Atk. 313.

Where a mortgage is made, the mortgagee should have the title deeds, as under some circumstances it has been held in equity that a subsequent mortgagee who has the title deeds of the mortgageor shall have a prior claim. A third mortgagee also who buys up the first mortgagee will be preferred to the second, if he had no notice of the second. By stat. 7 Geo. II. c. 20, where an action is brought to recover money due on mortgage, or an ejectment to get into the possession of the lands, if the defendant appears, and within six months pays the debt, interest, and costs, the writ shall be staid. And where a bill is filed in equity by the mortgagee to compel the mortgageor either to pay off the mortgage, or be foreclosed, or prevented from having his equity of redemption. the like time is allowed, and afterwards the estat is absolutely foreclosed. But the act does not extend to cases where the mortgager disputes the validity or fairness of the mortgage. By stat. 14 Geo III. c. 79, sect. 2, estates in the West Indies may be mortgaged here at West-India interest. A remainder man may force the tenant in tail to keep down the interest, but not to redeem a mortgage.

To MO'RTGAGE. *v. a.* To pledge; to put to pledge (*Arbuthnot*).

MORTGAGE'E. *s.* (from *mortgage*.) He that takes or receives a mortgage (*Temple*).

MORTGAGER. *s.* (from *mortgage*.) He that gives a mortgage.

MORTIFEROUS. *a.* (*mortifer*, Lat.) Fatal; deadly; destructive (*Hammond*).

MORTIFICATION. *s.* (*mortification*, French.) 1. The state of corrupting, or losing the vital qualities; gangrene. (See GANGRENE.) 2. Destruction of active qualities (*Bacon*). 3. The act of subduing the body by hardships and macerations (*Arbuthnot*). 4. Humiliation; subjection of the passions. 5. Vexation; trouble (*L'Estrange*).

To MO'RTIFY. *v. a.* (*mortifier*, French.) 1. To destroy vital qualities. 2. To destroy active powers, or essential qualities (*Bacon*). 3. To subdue inordinate passions (*Shakspeare*). 4. To macerate or harass the body to compliance with the mind (*Brown*). 5. To humble; to depress; to vex (*Addison*).

To MO'RTIFY. *v. n.* 1. To gangrene; to corrupt (*Bacon*). 2. To be subdued; to die away. 3. To practise religious severities (*Law*).

MORTIMER (John Hamilton), an English painter, was born at East Bourne, in Sussex, in 1739. He received his first instructions from his uncle, who was an itinerant painter; but afterwards he became a pupil of Hudson, and for some months resided with sir Joshua Reynolds. When the society for the encouragement of arts gave premiums for historical pictures, Mortimer carried away the prize of 100 guineas for a piece representing St. Paul converting the Britons. In 1779, he was appointed by his majesty a royal academician, without any solicitation; but that honour was hardly enjoyed by him, for he died the same year at his house in Norfolk-street.

MO'RTISE. *s.* (*mortaise*, Fr.) A hole cut into wood that another piece may be put into it and form a joint (*Shakspeare*).

To MO'RTISE. *v. a.* To cut to a mortise; to join with a mortise (*Drayton*).

MORTLAKE, a village in Surrey, seated on the Thames, six miles west of London. Great part of this parish is inclosed in Richmond Park; and his majesty has a farm here of 80 acres in his own occupation.

MORTLICH, a village in Banffshire, six miles S.W. of Keith. Here Malcolm II. in memory of a victory gained over the Danes, founded a bishopric, which was translated to Aberdeen by David I.

MORTMAIN, signifies an alienation of lands and tenements to any corporation, and their successors, as bishops, parsons, vicars, &c. which is restrained in Magna Charta, and cannot be done without the king's licence. The disposing of property to hospitals is allowed by 35 Eliz. c. 5, and various enactments have been made to prevent the influence of priests and crafty men from taking advantage of the last hours of the lives of weak devotees, by obtaining gifts in mortmain or perpetuity. The chief of these is the stat. 9 Geo. II. c. 36. (called the statute of mortmain) that no manors, lands, tenements, rents, advowsons, or other hereditaments, corporeal, or incorporeal, whatsoever, nor any sum or sums of money, goods, chattels, stocks in the public funds, securities for money, or other personal estate whatsoever, to be laid out or disposed of in the purchase of any lands, tenements, or hereditaments, shall be given, limited, or appointed by will, to any person or persons, bodies politic or corporate, or otherwise, for any estate or interest whatsoever, or any ways charged or incumbered by any person or persons whatsoever, in trust, or for the benefit of any charitable use whatsoever; but such gift shall be by deed, indented, sealed, and delivered in the presence of two or more credible witnesses, twelve calendar months at least before the death of such donor, and be inrolled in the high court of chancery within six calendar months after execution, and the same to take effect immediately after the execution for the charitable use intended, and be without any power of revocation, reservation, on trust for benefit of the donor. And by the fourth section all gifts or incumbrances otherwise made are void. This act however does not extend to prevent the making bequests, merely of money, to charitable uses.

MORTON (Thomas), a learned English bishop, was born at York in 1564, and educated at St. John's college, Cambridge, where he was chosen fellow. In 1603 he attended lord Eure, ambassador to the emperor of Germany, as his chaplain, and in 1607 was appointed dean of Gloucester. In 1609 he was made dean of Winchester, and in 1615 advanced to the see of Chester; from whence he was translated to Lichfield and Coventry in 1618. In 1632 he was removed to Durham. He suffered many hardships in the great rebellion, notwithstanding his age and exemplary character. He died in 1659. This worthy bishop has some small pieces in print.

MORTON (James earl of), regent of Scotland, was born at Dalkeith in 1530, and educated under the famous Buchanan at Paris. He returned to Scotland in 1554, and greatly promoted the reformation; but having been accused of the murder of lord Darnley, he fled to England. Afterwards he returned home, and was made chancellor of Scotland. In 1574 he succeeded the earl of Mar as regent, but resigned in 1579. He was condemned for high treason in 1581, and beheaded by a machine which he brought himself from England for the accommodation of his enemies, somewhat similar to the guillotine of France.

MORTON (William), a counsellor, who in the reign of Charles I. entered into the king's army, and became a lieutenant-colonel. In 1663 he was made a serjeant at law; and in 1665 a judge in the court of king's bench.

MORTON (John), archbishop of Canterbury, was a native of Dorchester, and became so eminent for his skill in jurisprudence, that Henry VI. and Edward IV. both made him a privy counsellor. He was also raised to the see of Ely, and lastly to the metropolitical seat of Canterbury. Henry VII. appointed him chancellor, and obtained for him a cardinal's hat. He died in 1500. (*Watkins*).

MORTON, or MORTON HAMPSTEAD, a town in Devonshire, with a noted market for yarn on Saturday. It is seated on a hill near Dartmoor, 14 miles S.W. of Exeter, and 185 W. by S. of London. Lon. 3. 46 W. Lat. 50. 39 N.

MORTON, or MORTON IN MARSH, a town in Gloucestershire, with a market on Tuesday, seated on a fossway, 29 miles E.S.E. of Worcester, and 83 W.N.W. of London. Lon. 1. 36 W. Lat. 52. 0 N.

MO'RTPAY. *s.* (*mort* and *pay*.) Dead pay; payment not made (*Bacon*).

MO'RTRESS. *s.* A dish of meat of various kinds beaten together (*Bacon*).

MORTUARY, in law, is a sort of ecclesiastical heriot (see HERIOT), being a customary gift claimed by and due to the minister in very many parishes on the death of his parishioners. They seem originally to have been only a voluntary bequest to the church; being intended, as Lyndewode informs us from a constitution of archbishop Langham, as a kind

of expiation and amends to the clergy for the personal tithes, and other ecclesiastical duties, which the laity in their life-time might have neglected or forgotten to pay. For this purpose, after the lord's heriot or best good was taken out, the second best chattel was reserved to the church as a mortuary. And therefore in the laws of king Canute, this mortuary is called soul scot, or *symbolum animæ*. And, in pursuance of the same principle, by the laws of Venice, where no personal tithes have been paid during the life of the party, they are paid at his death out of his merchandise, jewels, and other moveables. So also, by a similar policy in France, every man that died without bequeathing a part of his estate to the church, which was called dying without confession, was formerly deprived of christian burial; or, if he died intestate, the relations of the deceased, jointly with the bishop, named proper arbitrators to determine what he ought to have given to the church in case he had made a will. But the parliament, in 1409, redressed this grievance.

It was anciently usual in England to bring the mortuary to church along with the corpse when it came to be buried; and thence it is sometimes called a corse-present: a term which bespeaks it to have been once a voluntary donation. However in Bracton's time, so early as Henry III. we find it rivetted into an established custom: insomuch that the bequests of heriots and mortuaries were held to be necessary ingredients in every testament of chattels. *Imprimis autem debet quilibet, qui testamentum fecerit, dominum suum de meliori re quam habuerit recognoscere; et postea ecclesiam de alia meliori:* the lord must have the best good left him as an heriot: and the church the second best as a mortuary. But yet this custom was different in different places: *in quibusdam locis habet ecclesia melius animal de consuetudine; in quibusdam secundum, vel tertium melius; et in quibusdam nihil: et ideo consideranda est consuetudo loci.* This custom still varies in different places, not only as to the mortuary to be paid, but the person to whom it is payable. In Wales a mortuary or corse-present was due upon the death of every clergyman to the bishop of the diocess; till abolished, upon a recompence given to the bishop, by the statute 12 Ann. st. 2. c. 6. And in the archdeaconry of Chester a custom also prevailed, that the bishop, who is also archdeacon, should have at the death of every clergyman dying therein his best horse or mare, bridle, saddle, and spurs; his best gown or cloak, hat, upper garment under his gown, and tippet, and also his best signet or ring. But by statute 28 Geo. II. c. 6. this mortuary is directed to cease, and the act has settled upon the bishop an equivalent in its room. The king's claim to many goods, on the death of all prelates in England, seems to be of the same nature; though sir Edward Coke apprehends that this is a duty upon death, and not a mortuary: a distinction which seems to be without a difference. For not only the king's ecclesiastical character, as supreme ordinary, but also the species of the goods claimed, which bear so near a resemblance to those in the archdeaconry of Chester, which was an acknowledged mortuary, puts the matter out of dispute. The king, according to the record vouched by sir Edward Coke, is entitled to six things; the bishop's best horse or palfrey, with his furniture; his cloak or gown, and tippet; his cup and cover; his bason and ewer; his gold ring; and lastly, his *muta canum*, his mew or kennel of hounds.

This variety of customs with regard to mortuaries giving frequently a handle to exactions on the one side, and frauds or expensive litigations on the other, it was thought proper by statute 21 Hen. VIII. c. 6. to reduce them to some kind of certainty. For this purpose it is enacted, that all mortuaries, or corse-presents to parsons of any parish, shall be taken in the following manner, unless where by custom less or none at all is due: viz. for every person who does not leave goods to the value of ten marks, nothing: for every person who leaves goods to the value of ten marks and under 30 pounds, 3*s.* 4*d.*; if above 30 pounds, and under 40 pounds, 6*s.* 8*d.*; if above 40 pounds, of what value soever they may be, 10*s.* and no more. And no mortuary shall throughout the kingdom be paid for the death of any feme-covert; nor for any child; nor for any one of full age, that is not a house-keeper; nor for any wayfaring man; but such wayfaring man's mortuary shall be paid in the parish to which he belongs. And upon this statute stands the law of mortuaries to this day.

MORVAUNT, in mastiology. See OVIS.

MORUS. Mulberry. In botany, a genus of the class monœcia, order tetrandria. Male: calyx four-parted, corolless. Fem.: calyx four-leaved; corolless; styles two; calyx becoming a berry; seed one. Seven species, as follows:

1. M. nigra, common mulberry; a native of Italy.

2. M. alba, white mulberry; a native of China.

3. M papyrifera, paper mulberry tree; a native of Japan.

4. M. rubra, red-mulberry tree; a native of Virginia.

5 M. Indica, Indian mulberry; a native of the East Indies.

6 M. tinctoria, dyer's mulberry, or fustick-wood; a native of America.

7. M. Tatarica, Tartarian mulberry; a native of Siberia and Russia.

Of these three only are cultivated in our own gardens; the white, the black, and the paper mulberry.

The white mulberry is commonly planted in the south of Europe for its leaves as a food for the silk-worm (*phalæna mori*); yet the Persians use the common black mulberry conjointly with the white for this purpose. The trees which are designed to feed silk-worms should never be suffered to grow tall, but rather be kept in a hedge-form; and their leaves, instead of being pulled off singly, should be sheered off together, and with their young branches. This sort of mulberry may be propagated from seeds or layers: the best mode is, from seeds procured from the south of

France or Italy; and the best way to sow these seeds in England is to make a moderate hot-bed, which should be arched over with hoops, and covered with mats: upon this bed the seeds should be sown in the middle of March, and covered over with light earth, about a quarter of an inch deep. In very dry weather the bed should be frequently watered, and in the heat of the day shaded with mats, and also covered in cold nights. The black mulberry is common in most gardens, being planted for the delicacy of its fruit. It may be propagated by sowing the seeds, or by laying down the tender branches, which in two years will take root, and may then be transplanted to the places where they are to remain. Those plants which are propagated from seeds are commonly the most vigorous, and generally make the straightest stems: but then there is a very great hazard of their being fruitful; for it often happens that those plants for the most part are of the male kind, which produce katkins, but seldom have much fruit: but as the trees raised by layers are subject to have crooked unsightly stems, there should be care taken in the choice of straight shoots to make layers, and when they are transplanted out, they should have straight stalks fixed down by each, to which they should be fastened as the shoot is extended, until it comes to the height you design the stem: then you may suffer the branches to extend as they seem inclinable, for this tree should not be often pruned, but only such branches should be cut off which shoot cross, and bruise themselves by cutting against each other, and such as decay should also be cut off. This tree delights in a light soil, not too wet nor over dry, and should have an open exposure. The soil under this tree should also be every year well dug and manured, though scarcely any plants will grow under it.

The paper-mulberry, with palmate leaves and bristly fruit, may be propagated by laying down the branches and planting the cuttings in the manner directed for the black-mulberry. It takes its name from the use which is made of its bark by the Japanese. Yet the leaves both of this sort and of the Tartarian mulberry are used as food for the silk-worm, the former in France, and the latter very largely in China. The paper mulberry thrives best in a sandy soil, grows quicker than the black, and is not injured by the cold. M. de la Bouviere affirms, that he procured a beautiful vegetable silk from the bark of the young branches of this species of mulberry, which he cut while the tree was in sap, and afterwards beat and steeped. The women of Louisiana procure a similar material from the shoots which issue from the stock of the mulberry, and which are four or five feet high. After taking off the bark, they dry it in the sun, and then beat it, that the external part may fall off; and the internal part, which is fine bark, remains entire. This is again beaten, to to make it still finer; after which it is bleached in the dew. It is then spun, and various fabrics, such as nets and fringes, are made of it; they even sometimes weave it and manufacture it into cloth. The finest sort of cloth among the inhabitants of Otaheite and others of the South Sea islands is made of the bark of this tree.

The morus tinctoria is a fine-timber tree, and a principal ingredient in many of our yellow dyes; for which purpose it is chiefly imported into Europe. The berries are sweet and wholesome; but not much used, except by birds, who scatter them very widely, and hence largely contribute to the propagation of the plant.

MOSA (anc. geog.), a river of Belgica, rising in mount Vogesus on the borders of the Lingones, and which, after receiving a part of the Rhine called Vahalis, forms the island of the Batavia and passes off into the sea, at no greater distance than 80 miles: its mouth, which is large and broad, is that which Pliny calls Helius, denoting *lower*, according to some German writers. Now called the Maese, or Meuse; rising in Champaign, on the borders of the county of Burgundy, or the Franche Compté, at a village called Meuse, whence the appellation; and running north through Lorrain and Champaign into the Netherlands: it afterwards directs its course north-east, and then west; and joining the Waal runs to Dort, and falls into the German sea, a little below the Briel.—According to Baudrand, it twice receives the Waal; by the first junction forming the island Bommel; and again receives it at Worcum, from which place proceeding to Dort, it divides into two branches, which again uniting together form one large mouth discharging itself into the German sea.

MOSÆ PONS (anc. geog.) supposed to be Maestricht.

MOSAIC LAW, or the LAW OF MOSES, is the most ancient that we know of in the world, and is of three kinds; the moral law, the ceremonial law, and the judicial law. The different manner in which each of these was delivered may perhaps suggest to us a right idea of their different natures. The moral law, or ten commandments, for instance, was delivered on the top of the mountain, in the face of the whole world as being of universal influence, and obligatory on all mankind. The ceremonial was received by Moses in private in the tabernacle, as being of peculiar concern, belonging to the Jews only, and destined to cease when the tabernacle was down, and the vail of the temple rent. As to the judicial law, it was neither so publicly nor so audibly given as the moral law, nor yet so privately as the ceremonial; this kind of law being of an indifferent nature, to be observed, or not observed, as its rites suit with the place and government under which we live. The five books of Moses called the Pentateuch are frequently styled, by way of emphasis, the law. This was held by the Jews in such veneration, that they would not allow it to be laid upon the bed of any sick person, lest it should be polluted by touching the dead.

MOSAIC, or MOSAIC-WORK, an assemblage of little pieces of glass, marble, precious stones, &c. of various colours, cut square, and cemented on a ground of stucco, in such a manner as to imitate the colours and gradations of painting. The critics are divided as to the origin and reason of the name. Some derive it from *mosaicum*, a corruption of *musaicum*, as that is of *musivum*, as it was called among the Romans. Scaliger derives it from the Greek μυσα, and imagines the name was given to this sort of works as being very fine and ingenious. Nebricensis is of opinion it was so called, because *ex illis picturis ornabanter musea*.

It is impossible to ascertain the æra of the invention; but it is by no means improbable that

it was suggested by the forming of figures in pavements with different coloured stones or marbles. the durability of which substances, and their resistance of damps, suggested the introduction of imitations of objects on walls and parts of buildings exposed to the action of the weather; those, however, probably were at first very rude and tasteless performances. The Greeks transmitted the art to the Romans: it was perpetuated in Italy, according to the Abbé Barthelemy, during the incursions of the barbarians, and brought to perfection in Rome in subsequent ages, where the works of the best masters still remain for the admiration of the present and many future generations. The fragments, which are generally of marble, and cut into cubical forms, were distributed with great skill and judgment in the most impervious cement, and being thus firmly connected, the surface received a high polish. The elegance of the work consists in the true disposition of the fragments, their diminutive size, and the richness of the colours: of the latter several of the principal were obtained from the quarries of Sicily and Greece, "at the same time that the different shades were found blended in different species of marble. The whiteness and purity of snow was emulated by the Parian; alabaster, beautifully fair, by that from Synnada, in Phrygia; and unsullied ivory, by a different description from Asia Minor: the marble from Jassus, in Caria, furnished a glowing crimson; and those of Sicily, granites and rubies." The intermediate colours and gradations of colours were supplied by several means, particularly enamels, as appears from the mosaic works discovered in the Jesuit's college at Frescati, which were conveyed to the cabinet belonging to the order at Rome: in those the blue is a composition or paste; and in one of the pieces are two shades of yellow, one of which is marble, and the other brick.

There are specimens of ancient mosaic, composed exclusively of enamel, and such were those which adorned the floors and walls of a house discovered in the last century at Surrento, and which are attributed to Pollio. Among the pieces preserved at Rome, there were several that agreed with the ideas generally entertained of this laborious and durable species of ornament: but far superior were those valuable fragments found by M. Furietti in Adrian's villa at Tivoli, which he described in a work of great judgment and erudition. One of the pieces alluded to represents four doves, arranged on the rim of a vase, and is equally remarkable for the excellence of the performance, and the connection of the subject with another treated by Sosus, and taken from a house at Pergamus "The Abbe," observes M. Furietti, "is of opinion, that Adrian had caused it to be removed to embellish his house at Tivoli; but may we not as fairly presume that the emperor was satisfied with a copy of it? An idea that would solve some difficulties found in the writing of Pliny."

The monument, however, most interesting to antiquaries, was some years past preserved at the palace of the princes of the Barbarini family at Palestrina, and is the celebrated work in mosaic which in its original destination covered the sanctuary of the temple at Preneste. This magnificent specimen of ancient skill is described by Barthelemy as being about eighteen feet in length, and rather more than fourteen in breadth; and the attributes of the hunters and animals represented on a mountainous country, in the upper part, left him no reason to doubt that the scene was intended for Egypt. Greek characters inscribed beneath the animals give their names. "In the lower part of the mosaic we perceive the Nile, winding round several small islands; boats with oars, or sails; Egyptians in pursuit of crocodiles, which conceal themselves among the rushes; rustic cottages; superb buildings; priests performing religious ceremonies in their temples; Egyptian women, reclined under a bower on the borders of a canal, with cups or musical instruments in their hands; and, lastly, a magnificent tent, near which a general, followed by several soldiers, armed with lances and shields advances towards a female with a palm-branch in her left hand, and in her right a species of garland, which she holds out to him. "It was natural," adds this learned writer, "that the sagacity of antiquaries should be employed on so rich a composition. Father Kircher discovered in it the vicissitudes of fortune; cardinal Polignac, the arrival of Alexander in Egypt; and father Montfaucon, exhibitions of the Nile, of Egypt and of Ethiopia" Barthelemy, with more probability, thought it represented the arrival of the emperor Adrian in a province of Upper Egypt.

Very few, if any, pictures in mosaic have been found in England; but numbers of pavements of Roman origin have often been, and still are continually discovered. Those necessarily differ considerably from the delicate and beautiful works already noticed; and yet the neatness of their component parts, and the elegance of their figures, obtain and deserve admiration. Of more modern performances, there are still a sufficient number remaining in our abbey and cathedral churches to prove that we have not been deficient in this branch of the arts although no instances occur of our having adopted this method of decorating walls, which is rather singular, as prudence seems to suggest the propriety of giving stability to the performances of our artists, whose works are subject to constant damps from the humidity of the climate. Of all the pavements in mosaic left in our churches, not one can be compared with that placed by Richard Ware, abbot of St. Peter's, Westminster, before the high altar of the church, in 1272, which is thus described by Malcolm, in the first volume of Londinium Redivivum. "The materials are lapis-lazuli, jasper, porphyry, alabaster, Lydian, and serpentine marbles and touchstone. The centre of the design is a large circle, whose centre is a circular plane of porphyry, three spans and a quarter in diameter; round it stars of lapis-lazuli, pea-green, red and white, which being of most beautiful colours, have been subject to depredations; those enclosed by a band of alabaster; and without, a border of lozenges, red and green; the half lozenges contain triangles of the same colours. A dark circle held brass letters, the places of which may be seen; but are now reduced to six. The extreme lines of this great circle run into four smaller circles facing the cardinal points: that to the east, a centre of orange and green variegated; round it a circle of green and red wedges; without that, lozenges of the same colours; and completed by a dark border. To the north, the circle has a sexagon centre of variegated grey and yellow; round it a band of porphyry and a dark border. The west circle nearly similar. The south, a black centre within

a variegated octagon. A large lozenge incloses all the above circles, which is formed by a double border of olive-colour; within which, on one corner only, are 138 circles intersecting each other, and each made by four oval pieces, inclosing a lozenge. The other parts vary in figure; but would take many pages to describe.

"The above lozenge has a circle on each of its sides, to the north-west, south-west, north-east, and south-east. The first contains a sexagon, divided by lozenges of green; within which are forty-one red stars. In the intersections red triangles. Green triangles form a sexagon round every intersection. The second contains a sexagon; within it seven stars of red and green, forming several sexagons, containing yellow stars. The third has a sexagon, formed by intersecting lines into sexagons and triangles; within the former stars of red and green. The latter sixteen smaller triangles of red, green, and yellow. The last a sexagon, with thirty-one within it, filled by stars of six rays, green and yellow. The spaces within the great lozenge round the circles is composed of circles, stars, squares, lozenges, and triangles, the component parts of which are thousands of pieces of the above shapes. The whole of the great lozenge and circles is inclosed by a square; the sides to the cardinal points. It has held other parts of the inscription: of this O and Є only remain on the eastern side, N O on the south, none on the west, and Є on the north. The four outsides are filled by parallelograms and circles of considerable size, all divided into figures nearly similar to those described."

The above descriptions of mosaic pictures and mosaic pavements will convey a competent idea of the nature of the art. The manner in which they are composed is explained by Keysler, whose accuracy is almost proverbial. According to this valuable author, persons were constantly employed at Rome in making copies in mosaic of those excellent pictures which adorned the walls of St Peter's church, to replace the latter, as the damps of the building were annually and gradually destroying them. The materials used in his time were small pieces of glass, tinted with different gradations of colours, in the manner of the fine worsted used for needle-work. The glass was cast in thin plates, and afterwards cut into pieces of different lengths and breadths: some of those intended for the composition of figures to be placed on vaults and ceilings were above half an inch in width; but those used for subjects situated near the spectator were formed by pieces not thicker than a common pin, of which two millions are said to be necessary to compose a portrait four feet square. The substance prepared to receive these shreds of glass is a kind of paste, composed of calcined marble, fine sand, gum-tragacanth, the white of eggs, and oil. As some time elapses before the ground hardens, there is no difficulty immediately arising from the act of placing the glass properly, or in removing those which may be found misplaced; but after a certain interval it becomes so extremely solid, that nothing less than violence has any effect upon it. Keysler mentions, that "the paste is first spread in a frame of wood, which must not be less than a foot in breadth and thickness, if the piece be any thing large." The frame is secured by brass nails to a plane of marble or stone; and as some of the most important subjects are twenty feet in length, and fifteen in breadth, an idea may be formed of their very great weight. The fragments of glass are arranged in their proper gradations in cases, which are placed before the artist in the manner that types are set before compositors in printing. The former were so very accurate in imitating the most beautiful strokes of the pencil, that the difference, according to Keysler, seems to consist only in the colours of the copy being more vivid and brilliant than those of the painting. When the copy is completed, they polish them in the same manner usually with mirrors; and after this operation is performed, it is almost impossible to discover that they are composed of an infinite number of fragments, as they rather resemble rich pictures covered with glass. Those pieces that are intended for distant view are never polished.

The pieces of which mosaic work were originally formed were very large, and sometimes gilded and silvered. About the close of the third century, a Florentine, named Andrea Tasai, contemporary with Cimabue, the restorer of the art of painting, introduced an improved manner of executing it, which soon attracted the attention of the rich and powerful, and in consequence mosaic paintings became much more common than they had been for a long time before. Tasai, however, does not deserve the sole merit of reviving the art, as he acquired his skill from Apollonius, a Greek, who had performed several very fine pieces for St. Mark's church at Venice.

A few specimens of the gilded manner of executing figures in mosaic may still be seen in England, and particularly in Westminster Abbey, where the tombs of Edward the Confessor and of Henry III. have been adorned in this way in fanciful figures, some of which are perfect, but the greater part are destroyed by the silly practice of picking out the fragments of glass, to discover what may be seen on each side—the mode of setting them in the cement. "How much," says Keysler, "this curious art has been improved, during the two last centuries, may be easily seen, by comparing the coarse works in some of the old cupolas of the chapels in St. Peter's church with the other pieces lately erected there. The studs in these old works are made of clay burnt, and the surface only tinctured with various colours."

In Clavigero's history of Mexico is described a curious kind of mosaic-work made by the ancient Mexicans of the most delicate and beautiful feathers of birds. They raised for this purpose various species of birds of fine plumage with which that country abounds, not only in the palaces of the king, where there were all sort of animals, but likewise in private houses; and at certain seasons they carried off their feathers to make use of them on this kind of work, or to sell them at market. They set a high value on the feathers of those wonderful little birds which they call huitzitzil, and the Spaniards picaflores, on account of the smallness, the fineness, and the various colours of them. In these and other beautiful birds, nature supplied them with all the colours which art can produce, and also some which art cannot imitate. At the undertaking of every mosaic work several artists assembled: after having agreed upon a design, and taken their measures and proportions, each artist charged himself with the execution of a certain part of the image, and exerted himself so diligently in it with such patience and application, that he frequently spent a whole day in adjusting a feather; first trying one, then another; viewing it sometimes one way, then another, until he found one which gave his part that ideal perfection proposed to be attained.

When the part which each artist undertook was done, they assembled again to form the entire image from them. If any part was accidentally the least deranged, it was wrought again until it was perfectly finished. They laid hold of the feathers with small pincers, that they might not do them the least injury, and pasted them on the cloth with tzauhtli, or some other glutinous matter; then they united all the parts upon a little table, or a plate of copper, and flattened them softly, until they left the surface of the image so equal and smooth that it appeared to be the work of a pencil.

These were the images so much celebrated by the Spaniards and other European nations. Whoever beheld them was at a loss whether he ought to have praised most the life and beauty of the natural colours, or the dexterity of the artist and the ingenious disposition of art. "These images (says Acosta) are deservedly admired; for it is wonderful how it was possible, with the feathers of birds, to execute works so fine and so equal, that they appear the performance of the pencil; and what neither the pencil nor the colours in painting can effect, they have, when viewed from a side, an appearance so beautiful, so lively, and animated, they give delight to the sight. Some Indians, who are able artists, copy whatever is painted with a pencil so perfectly with plumage, that they rival the best painters of Spain." These works of feathers were even so highly esteemed by the Mexicans as to be valued more than gold.

MOSAMBIQUE, a strait or channel of the Indian Ocean, between the E. coast of Africa and the island of Madagascar, and between 11 and 25° S. lat. It is narrowest in the middle, where it is 240 miles over; and in this part, on the coast of Zanguebar, is a kingdom, island, and town of the same name.

Mosambique, a kingdom of Africa, on the W. side of a channel of the same name, and on the coast of Zanguebar, consisting of three islands. The principal island, called Mosambique, is not more than three miles in length, and half as much in breadth, and is about two miles from the continent. It was seized by the Portuguese in 1497, and they have kept possession of it ever since.

Mosambique, the capital of an island of the same name, on the E. coast of Africa. It is large and well fortified, having a strong citadel to defend the harbour. It belongs to the Portuguese, who have generally a good garrison here, and trade with the natives for gold, elephants teeth, and slaves. They have built several churches and monasteries, and a large hospital for sick sailors. Their ships always call here in going to the East Indies; and the harbour is so commodious that whole fleets may anchor and provide themselves with all necessaries. Lon. 40. 10 E. Lat. 15. 5 S.

MOSBACH, a town of Germany, in the palatinate of the Rhine, with a castle, seated on the Neckar, 26 miles E.N.E. of Heidelberg. Lon. 9. 21 E. Lat. 49. 28 N.

MOSBRUNN, a town of the archduchy of Austria, eight miles S. of Vienna.

MOSBURG, a town of Germany, in the duchy of Carinthia, six miles N.W. of Clagenfurt.

Mosburg, a town of Germany, in Bavaria, seated at the confluence of the Iser and Ambert, nine miles W. of Landschut. Lon. 11. 55 E. Lat. 48. 30 N.

MOSCHATEL (Tuberous), in botany. See Adoca.

MOSCHEL, or Ober Mouschel, a town of Germany, in the duchy of Deux Ponts, 10 miles N.E. of Weissemburg, and 32 N.N.E. of Deux Ponts. Lon. 7. 29 E. Lat. 49. 46 N.

MOSCHION, a name common to four different writers, whose compositions, character, and native place, are unknown. Some fragments of their writings remain, some few verses, and a treatise De mulierum affectibus.

MOSCHUS, a Grecian poet of antiquity, usually coupled with Bion; and they were both of them cotemporaries with Theocritus. In the time of the latter Grecians all the ancient Idylliums were collected and attributed to Theocritus; but the claims of Moschus and Bion have been admitted to some few little pieces; and this is sufficient to make us inquisitive about their characters and story: yet all that can be known about them must be collected from their own remains. Moschus, by composing his delicate elegy on Bion, has given the best memorials of Bion's life. Moschus and Theocritus have by some critics been supposed the same person; but there are irrefragable evidences against it: others will have him as well as Bion to have lived later than Theocritus, upon the authority of Suidas; while others again suppose him to have been the scholar of Bion, and probably his successor in governing the poetic school; which, from the elegy of Moschus, does not seem unlikely. Their remains are to be found in all the editions of the Poetæ Mineros. See Bion.

Moschus. (*moschus*, μοσχος, *mosch*, Arab.). Musk. An unctuous substance, contained in excretory follicles about the navel of the moschus moschiferus, whose strong and permanent smell is peculiar to it. (See Moschus, in zoology.) It is contained in a bag placed near the umbilical region of a ruminating quadruped, resembling the antelope, from which it does not differ sufficiently to form a particular genus. The medicinal and chemical properties of musk and castor are very similar: the virtues of the former are generally believed to be more powerful, and hence musk is preferred in cases of imminent danger. It is prescribed as a powerful antispasmodic in convulsive diseases, hydrophobia, &c. and is by many said to be a violent aphrodisiac.

Moschus. Musk. In zoology, a genus of the class mammalia, order pecora. Hornless; fore-teeth, lower eight; tusks, upper solitary, projecting. Six species. The greater number of them afford musk; whence the generic name: a few however have not this property. The substance called musk is extracted from a bag situated near the umbilical region, and chiefly from this organ in the moschus moschifer. The species are as follow:

1. M. moschifer. Thibet musk. In form, this animal resembles a small roebuck. It measures three feet three inches in length, and in height between two and three feet. Its upper jaw is considerably longer than the lower. Its tusks are nearly two inches long, and project, naked, beyond the lower jaw. Its ears are long and narrow, within of a pale yellow, and without of a deep brown colour. The hair of the body is very long, and stands erect; each hair is marked from tip to root with short waves; the colour at the roots of the hair is black, in the middle cinereous, and at the tips ferruginous. Each jaw is armed with six grinders. The hoofs are black, long, and divided for a considerable length. The inguinal bag contains musk: this bag, according to Neumann, has no opening like that of the civet cat, and hence the musk is not to be got till after the death of the animal. This chemist informs us he has seen the animal alive, and observed that the apartment in which it was kept had a very strong musky smell; and that on the white walls on which the animal had rubbed itself there was an unctuous matter of the same smell.

This species is a native of Asia, and is found between 44° or 45°, and 60° of north latitude. It inhabits the kingdom of Thibet, the province of Mohang Meng in China, Tonquin and Bontan. In the Russian dominions, and on the confines between Russia and China, it is found in the country around the lake Baikal, and near the rivers Jenesea and Argun.

Naturally a mild and timid animal, the Thibet musk, in the rutting season, in the months of November and December, acquires new courage from the impulse of love. Rival males then combat fiercely with their tusks. As it is naturally timid, so it is also solitary and unsocial. It seeks the cliffs and pine-clad summits of steep and lofty mountains; descending at times into the deep vales by which those are separated. In running, leaping, climbing, swimming, it displays astonishing agility. Few animals that the hunter pursues lead him through greater dangers, or require him to exert such address and activity in the chace. But the value of the musk causes danger to be overlooked; and the animal is shot with arrows, or taken in snares, or sometimes falls by a sudden discharge from a cross-bow placed in its tracks. The flesh, though infected, especially about the rutting time, with the musk, is tolerable food. The skin and hair are not without their uses.

2. M. Indicus. Indian musk. This species is an inhabitant of India; somewhat larger in size than the former; and distinguished by slender legs, oblong, erect ears, and the resemblance which its head bears, in shape, to that of a horse.

3. M. Americanus. Brazilian musk, or wirrebocerra. In size, this animal approaches to an equality with the European roebuck. Its back, sides, chest, and thighs, are of a bright rust colour; but the lower part of the belly and the inside of the thighs white. Its eyes are large and black; its ears four inches long; the tail six inches long; the legs slender, yet muscular.

These creatures, peculiar to Guinea and Brazil, are remarkable for their timidity, and for a correspondent lightness of form, and agility of motion. Like goats, they are sometimes seen standing with their four legs together on the point of a rock. The delicacy of their flesh draws upon them a number of enemies. The Indians, tygers, and other beasts of prey, all eagerly pursue them. Their safety is most endangered when they attempt to swim; for their legs are but very ill adapted to that exercise. They are ranked in this genus, not as affording musk, but as wanting horns.

4. M. meminna. An inhabitant of Java and Ceylon: form is diminutive: not more than one foot five inches in length: its whole weight only five pounds and a half. Its ears large and open; its tail very short; its sides and haunches variegated with spots, and transverse bars of white on a cinereous olive ground. The rest of the upper part of its body is a cinereous olive, without spots. Its throat, breast, and belly are white.

5. M. Javanicus. Java musk. Equal in size to a rabbit, with remarkably slender, puny legs; with its snout and ears bare, without pits in the groin, or under the eye; having tufts on its knees; and under its throat, two long divergent hairs. The neck is hoary, with an intermixture of yellow; a black line marks the crown of the head; the general colour of the body is ferruginous; the neck and belly are white, but the neck variegated with two dusky spots. The tail is of a moderate length, and terminates in a white tuft. A native of Java.

6. M. pygmæus. Guinea musk. This animal, notwithstanding its name, is an inhabitant of the continent of India, and the Oriental islands, rather than of Guinea. It is only nine inches and a half in length; has two small tusks in its upper jaw; large ears; and a tail an inch long. Its belly is white, and the rest of its body tawny; but the specimens vary in colour. Among the Malays, they are caught in great numbers, carried to market in cages, and sold at a very moderate price.

Two sorts of musk are distinguished in commerce; the one is inclosed in the bags, the other is extracted; and each of these is again subdivided according to the country from which they are brought. Hence the difference between the Tonquin or East Indian musk, and the Muscovy or Persian musk. The Tonquin bags have commonly small brownish hairs upon them; the Persian large white ones. The former are accounted the best; but the difference seems to consist rather in quantity than in quality; the thinner and less having bags containing more in proportion to their weight than the others. From the dearness of this drug, it is often adulterated: and there is no determinate criterion to ascertain its purity. The best method is to compare it with real specimens.

Musk to the chemist offers the appearance of a dark brown, or a rusty reddish-coloured substance; occasionally it is clothed like coagulated blood. To the touch it is unctuous, and on drying becomes pulverizable. It has a bitterish savour, and its aroma is peculiarly strong and aromatic; disagreeable, if too concentrated; but when largely diluted with other matters, or greatly extended in the atmosphere, it becomes a pleasant perfume. From its aroma being remarkably diffusive and tenacious, every thing in its vicinity becomes perfectly infected with it, and retains it a long time. Water will extract two-fifths of it; and the distilled water is highly impregnated with its aroma and savour: alkohol takes up one third of it, but retains little or nothing of its aroma. Nitrous and vitriolic acids totally dissolve it; the first destroys the whole of its aroma, the latter the greater part of it. Mineral alkali extracts

from it the smell of volatile alkali, when these two substances are rubbed together. Oils have no action upon it. Cast on red-hot coals, it emits an urinous smell. On distillation Neumann obtained the same products as from other animal substances: viz. an empyreumatic oil, a volatile spirit, and salt. By impregnating the waters and spirits distilled from odoriferous vegetables with a minute portion of musk, their fragrance is considerably improved, without receiving any of its own peculiar aroma. According to Fourcroy, it resembles castor in its chemical properties; and consists of resin united to a certain quantity of mucilage, bitter extract, and salt: its virtues are stronger than those of castor.

MOSCOVY. See RUSSIA.

MOSCOW, formerly a duchy, but now one of the 41 governments of Russia; bounded on the N. by the government of Tver, on the E. by that of Great Volodimir, on the S. by the governments of Kalugo and Resan, and on the W. by those of Tver and Smolensko.

MOSCOW, or MOSKVA, a city of Russia, and capital of a government, on a river of the same name. It derives its name from the river Moskva, which runs on the south side of it. Moscow was founded in the year 1156; at least it appears to have been a city in 1175. It lies in a round situation, formed by the winding of the river.

Moscow is represented as the largest town in Europe; its circumference within the rampart, which encloses the suburbs, being exactly 39 versts or 26 miles; but it is built in so straggling and disjointed a manner, that its population in no degree corresponds to its extent. Some Russian authors state its inhabitants at 500,000 souls, a number evidently exaggerated. According to a late computation, which Mr. Coxe says may be depended upon, Moscow contains within the ramparts 250,000 souls, and in the adjacent villages 50,000. The streets of Moscow are in general exceedingly long and broad: some of them are paved; others, particularly those in the suburbs, are formed with trunks of trees, or are boarded with planks like the floor of a room; wretched hovels are blended with large palaces; cottages of one story stand next to the most superb and stately mansions. Many brick structures are covered with wooden tops; some of the wooden houses are painted: others have iron doors and roofs. Numerous churches present themselves in every quarter, built in a peculiar style of architecture; some with domes of copper, others of tin, gilt or painted green, and many roofed with wood. In a word, some parts of this vast city have the look of a sequestered desert, other quarters of a populous town; some of a contemptible village, others of a great capital.

Moscow may be considered as a town built upon the Asiatic model, but gradually becoming more and more European, and exhibiting in its present state a motley mixture of discordant architecture. It is distributed into the following divisions. 1. The Kremlin. This stands in the central and highest part of the city; is of a triangular form, and about two miles in circumference; and is surrounded by high walls of stone and brick, which were constructed in the year 1491, under the reign of Ivan Vassilievitch I. It contains the ancient palace of the czars, several churches, two convents, the patriarchal palace, the arsenal now in ruins, and one private house, which belonged to Boris Godunof before he was raised to the throne. 2. Khitaigorod, or the Chinese town, is inclosed on one side by that wall of the Kremlin which runs from the Moskva to the Neglina; and on the other side by a brick wall of inferior height. It is much larger than the Kremlin, and contains the university, the printing-house, and many other public buildings, and all the tradesmens shops. The edifices are mostly stuccoed or white-washed, and it has the only street in Moscow in which the houses stand close to one another without any intervals between them. 3. The Bielgorod, or White Town, which runs quite round the two preceding divisions, is supposed to derive its name from a white wall with which it was formerly inclosed, and of which some remains are still to be seen. 4. Semlainogorod, which environs all the three other quarters, takes its denomination from a circular rampart of earth with which it is encompassed. These two last mentioned divisions exhibit a grotesque group of churches, convents, palaces, brick and wooden houses, and mean hovels, in no degree superior to peasants cottages. 5. The Sloboda, or suburbs, form a vast exterior circle round all the parts already described, and are invested with a low rampart and ditch. These suburbs contain, beside buildings of all kinds and denominations, corn-fields, much open pasture, and some small lakes, which give rise to the Neglina. The river Moskva, from which the city takes its name, flows through it in a winding channel; but, excepting in spring, is only navigable for rafts. It receives the Yausa in the Semlainogorod, and the Neglina at the western extremity of the Kremlin: the beds of both these last-mentioned rivulets are in summer little better than dry channels.

The places of divine worship at Moscow are exceedingly numerous: including chapels, they amount to above 1000: there are 484 public churches, of which 199 are of brick, and the others of wood; the former are commonly stuccoed or white-washed, the latter painted of a red colour. The most ancient churches of Moscow are generally square buildings, with a cupola and four small domes, some whereof are of copper or iron gilt; others of tin, either plain or painted green. These cupolas and domes are for the most part ornamented with crosses entwined with thin chains or wires. The church of the Holy Trinity, sometimes called the church of Jerusalem, which stands in the Khitaigorod, close to the gate leading into the Kremlin, has a kind of high steeple and nine or ten domes; it was built in the reign of Ivan Vassilievitch II. The inside of the churches is mostly composed of three parts: that called by the Greeks πρόναος, by the Russians trapeza, the body, and the sanctuary or shrine. Over the door of each church is the portrait of the saint to whom it is dedicated, to which the common people pay their homage as they pass along by taking off their hats, crossing themselves, and occasionally touching the ground with their heads. The bells, which form no inconsiderable part of public worship in this country, as the length or shortness of their peals ascertains the greater or lesser sanctity of the day, are hung in belfreys detached from the church: they do not swing like our bells; but are fixed immoveably to the beams, and are rung by a rope tied to the clapper and pulled sideways. Some of these bells are of a stupendous size; one in the tower of St. Ivan's church weighs 3551 Russian poods, or 127,836 English pounds. It

has always been esteemed a meritorious act of religion to present a church with bells; and the piety of the donor has been measured by their magnitude. According to this mode of estimation, Boris Godonof, who gave a bell of 288,000 pounds to the cathedral of Moscow, was the most pious sovereign of Russia, until he was surpassed by the empress Anne, at whose expence a bell was cast weighing 432,000 pounds, and which exceeded in bigness every bell in the known world. The height of this enormous bell is 19 feet, its circumference at the bottom 21 yards 11 inches; its greatest thickness 23 inches. The beam to which this vast machine was fastened being accidentally burnt, the bell fell down, and a fragment was broken off towards the bottom, which left an aperture large enough to admit two persons a-breast without stooping.

Moscow is the centre of the inland commerce of Russia, and particularly connects the trade between Europe and Siberia. The only navigation to this city is formed by the Moskva, which falling into the Occa near Columna, communicates by means of that river with the Volga. But as the Moskva is only navigable in spring upon the melting of the snows, the principal merchandise is conveyed to and from Moscow upon sledges in winter. As to the retail commerce here, the whole of it is carried on in the Khitaigorod; where, according to a custom common in Russia, as well as in most kingdoms of the East, all the shops are collected together in one spot. The place is like a kind of fair, consisting of many rows of low brick buildings; the interval between them resembling alleys. These shops or booths occupy a considerable space; they do not, as with us, make part of the houses inhabited by the tradesmen, but are quite detached from their dwellings, which for the most part are at some distance in another quarter of the town. The tradesman comes to his shop in the morning, remains there all day, and returns home to his family in the afternoon. Every trade has its separate department; and they who sell the same goods have booths adjoining to each other. Furs and skins form the most considerable article of commerce in Moscow; and the shops which vend those commodities occupy several streets.

Among the curiosities of Moscow, the market for the sale of houses is not the least remarkable. It is held in a large open space in one of the suburbs; and exhibits a great variety of ready-made houses, thickly strewed upon the ground. The purchaser who wants a dwelling repairs to this spot, mentions the number of rooms he requires, examines the different timbers, which are regularly numbered, and bargains for that which suits him. The house is sometimes paid for on the spot, and taken away by the purchaser; or sometimes the vender contracts to transport and erect it upon the place where it is designed to stand. It may appear incredible to assert that a dwelling may be thus bought, removed, raised, and inhabited, within the space of a week; but we shall conceive it practicable by considering that these ready-made houses are in general merely collections of trunks of trees tenanted and mortoised at each extremity into one another, so that no thing more is required than the labour of transporting and adjusting them. But this summary mode of building is not always peculiar to the meaner hovels; as wooden structures of very large dimensions and handsome appearance are occasionally formed in Russia with an expedition almost inconceivable to the inhabitants of other countries. A remarkable instance of this dispatch was displayed the last time the empress came to Moscow. Her majesty proposed to reside in the mansion of prince Galitzin, which is esteemed the completest edifice in this city; but as it was not sufficiently spacious for her reception, a temporary addition of wood, larger than the original house, and containing a magnificent suite of apartments, was begun and finished within the space of six weeks. This meteor-like fabric was so handsome and commodious, that the materials, which were taken down at her majesty's departure, were to be reconstructed as a kind of imperial villa upon an eminence near the city. Mr. Coxe mentions an admirable police in this city for preventing riots, or for stopping the concourse of people in case of fires, which are very frequent and violent in those parts, where the houses are mostly of wood, and the streets are laid with timber. At the entrance of each street there is a chevaux de frize gate, one end whereof turns upon a pivot, and the other rolls upon a wheel; near it is a centry-box in which a man is occasionally stationed. In times of riot or fire the centinel shuts the gate, and all passage is immediately stopped. Lon. 37. 31 E. Lat. 55. 45 N.

Dr. E. D. Clarke, a recent traveller in Russia, gives the following picturesque and lively representation of the first appearance of Moscow to a stranger:

"We arrived at the season of the year in which this city is most interesting to strangers. Moscow is in every thing extraordinary; as well in disappointing expectation as in surpassing it; in causing wonder and derision, pleasure and regret. Let me conduct the reader back with me again to the gate by which we entered, and thence through the streets. Numerous spires, glittering with gold, amidst burnished domes, and painted palaces, appear in the midst of an open plain, for several versts before you reach this gate. Having passed, you look about, and wonder what is become of the city, or where you are; and are ready to ask, once more, How far is it to Moscow? They will tell you, "This is Moscow!" and you behold nothing but a wide and scattered suburb, huts, gardens, pigsties, brick walls, churches, dunghills, palaces, timber-yards, warehouses, and a refuse as it were of materials sufficient to stock an empire with miserable towns and miserable villages. One might imagine all the states of Europe and Asia had sent a building, by way of representative, to Moscow: and under this impression the eye is presented with deputies from all countries, holding congress: timber huts from regions beyond the Arctic; plastered palaces from Sweden and Denmark, not white-washed since their arrival; painted walls from the Tyrol; mosques from Constantinople; Tartar temples from Buchario; pagodas, pavilions and virandas from China; cabarets from Spain; dungeons, prisons, and public offices from France; architectural ruins from Rome; terraces and trellisses from Naples; and warehouses from Wapping.

"Having heard accounts of its immense population, you wander through deserted streets. Passing suddenly towards the quarter where the shops are situated, you might walk upon the heads of thousands. The daily throng is there so immense, that unable to force a passage through it, or assign any motive that might convene such a multitude; you ask the

cause, and are told that it is always the same. Nor is the costume less various than the aspect of the buildings; Greeks, Turks, Tartars, Cossacks, Chinese, Muscovites, English, French, Italians, Poles, Germans, all parade in the habits of their respective countries."

MOSELLE, a river of Germany, which rises in the mountains of Vauge in Lorrain, and, running through that duchy and the electorate of Triers, falls into the Rhine at Coblentz.

MOSES, the son of Amram and Jochebed, was born in the year 1571 before Christ. Pharaoh king of Egypt, perceiving that the Hebrews were become a formidable nation, issued forth an edict commanding all the male children to be put to death. Jochebed the mother of Moses, having, to avoid this cruel edict, concealed her son for three months, at length made an ark or basket of bulrushes, daubed it with pitch, laid the child in it, and exposed him on the banks of the Nile.—Thermuthis the king's daughter, who happened to be walking by the river's side, perceived the floating cradle, commanded it to be brought to her, and struck with the beauty of the child, determined to preserve his life. In three years afterwards the princess adopted him for her own son, called his name Moses, and caused him to be diligently instructed in all the learning of the Egyptians. But his father and mother, to whom he was restored by a fortunate accident, were at still greater pains to teach him the history and religion of his fathers. Many things are related by historians concerning the first period of Moses's life, which are not to be found in the Old Testament. Thus, we are merely told (Acts vii. 20.) that "Moses was *exceeding* fair," or as the original (αστειος τω Θεω) should be rendered *beautiful through God;* i. e. through God's peculiar favour and blessing. But Josephus relates, that when Moses was but three years old, no one who saw him could help being struck with his beauty, and that as he was carried about, people would leave their business to gaze at him; and he introduces Pharaoh's daughter calling him *a child divine in form.* Philo (in Vitâ Mosis) says, that at his birth he had a more elegant and beautiful appearance than denoted an ordinary person. And it appears from Justin (lib. xxxvi. cap. 2.) that the fame of Moses's uncommon beauty had spread among the heathen.

According to Josephus and Eusebius, he made war on the Ethiopians, and completely defeated them. They add, that the city Saba, in which the enemy had been forced to take refuge, was betrayed into his hands by the king's daughter, who became deeply enamoured of him, when she beheld from the top of the walls his valorous exploits at the head of the Egyptian army. But as the truth of this expedition is more than doubtful, we shall therefore confine ourselves to the narrative of sacred writ, which commences at the fortieth year of Moses's life. He then left the court of Pharaoh, and went to visit his countrymen the Hebrews, who groaned under the ill-usage and oppression of their unfeeling masters. Having perceived an Egyptian smiting an Hebrew, he slew the Egyptian, and buried him in the sand. But he was obliged, in consequence of this murder, to fly into the land of Midian, where he married Zipporah, daughter of the priest Jethro, by whom he had two sons, Gershom and Eliezar. Here he lived 40 years; during which time his employment was to tend the flocks of his father-in-law. Having one day led his flock towards Mount Horeb, God appeared to him in the midst of a bush which burned with fire but was not consumed, and commanded him to go and deliver his brethren from their bondage. Moses at first refused to go; but was at length prevailed on by two miracles which the Almighty wrought for his conviction. Upon his return to Egypt, he, together with his brother Aaron, went to the court of Pharaoh, and told him that God commanded him to let the Hebrews go to offer sacrifices in the desert of Arabia. But the impious monarch disregarded this command, and caused the labour of the Israelites to be doubled. The messengers of the Almighty again returned to the king, and wrought a miracle in his sight, that they might move his heart, and induce him to let the people depart. Aaron having cast down his miraculous rod, it was immediately converted into a serpent; but the same thing being performed by the magicians, the king's heart was hardened more and more; and his obstinacy at last drew down the judgments of the Almighty on his kingdom, which was afflicted with ten dreadful plagues. The first was the changing the waters of the Nile and of all the rivers into blood, so that the Egyptians died of thirst. In consequence of the second plague, the land was covered with innumerable swarms of frogs, which entered even into Pharaoh's palace. By the third plague, the dust was converted into lice, which cruelly tormented both man and beast. The fourth plague was a multitude of destructive flies which spread throughout Egypt, and infested the whole country. The fifth was a sudden pestilence, which destroyed all the cattle of the Egyptians, without injuring those of the Israelites. The sixth produced numberless ulcers and fiery biles upon man and upon beast. The seventh was a dreadful storm of hail, accompanied with thunder and lightning, which destroyed every thing that was in the field, whether man or beast, and spared only the land of Goshen, where the children of Israel dwelt. By the eighth plague swarms of locusts were brought into the country, which devoured every green herb, the fruit of the trees, and the produce of the harvest. By the ninth plague thick darkness covered all the land of Egypt, except the dwellings of the children of Israel. The tenth and last plague was the death of the first-born in Egypt, who were all in one night cut off by the destroying angel, from the first-born of the king to the first-born of the slaves and of the cattle. This dreadful calamity moved the heart of the hardened Pharaoh, and he at length consented to allow the people of Israel to depart from his kingdom.

Profane authors who have spoken of Moses seem to have been in part acquainted with these mighty wonders. That he performed miracles must have been allowed by many, by whom he was considered as a famous magician; and he could scarcely appear in any other light to men who did not acknowledge him for the messenger of the Almighty. Both Diodorus and Herodotus mention the distressed state to which Egypt was reduced by these terrible calamities. The Hebrews, amounting to the number of 600,000 men, without reckoning women and children, left Egypt on the 15th day of the month Nisan, which, in memory of this deliverance, was thenceforth reckoned the first month of their year. Scarcely had they reached the shore of the Red Sea when Pha-

raoh with a powerful army set out in pursuit of them. On this occasion Moses stretched forth his rod upon the sea; and the waters thereof being divided, remained suspended on both sides till the Hebrews passed through dry-footed. The Egyptians determined to follow the same course; but God caused a violent wind to blow, which brought back the waters to their bed, and the whole army of Pharaoh perished in the waves.

After the miraculous passage of the Red Sea, the army proceeded towards Mount Sinai, and arrived at Marah, where the waters were bitter; but Moses, by casting a tree into them, rendered them fit for drinking. Their tenth encampment was at Rephidim; where Moses drew water from the rock in Horeb, by smiting it with his rod. Here likewise Amalek attacked Israel. While Joshua fought against the Amalekites, Moses stood on the top of a hill, and lifted up his hands; in consequence of which the Israelites prevailed, and cut their enemies in pieces. They at length arrived at the foot of Mount Sinai on the third day of the ninth month after their departure from Egypt. Moses having ascended several times into the Mount, received the law from the hand of God himself in the midst of thunders and lightnings, and concluded the famous covenant betwixt the Lord and the children of Israel. When he descended from Sinai, he found that the people had fallen into the idolatrous worship of the golden calf. The messenger of God, shocked at such ingratitude, broke in pieces the tables of the law which he carried in his hands, and put 23,000 of the transgressors to the sword. He afterwards reascended into the mountain, and there obtained new tables of stone on which the law was inscribed. When Moses descended, his face shone so that the Israelites dared not to come nigh unto him, and he was obliged to cover it with a veil. The Israelites were here employed in constructing the tabernacle according to a pattern shown them by God. It was erected and consecrated at the foot of the Mount Sinai on the first day of the first month of the second year after their departure from Egypt; and it served the Israelites instead of a temple till the time of Solomon, who built a house for the God of his fathers after a model shown him by David.

Moses having dedicated the tabernacle, he consecrated Aaron and his sons to be its ministers, and appointed the Levites to its service. He likewise gave various commandments concerning the worship of God and the political government of the Jews. This was a theocracy in the full extent of the word. God himself governed them immediately by means of his servant Moses, whom he had chosen to be the interpreter of his will to the people; and he required all the honours belonging to their king to be paid unto himself. He dwelt in his tabernacle, which was situated in the middle of the camp, like a monarch in his palace. He gave answers to those who consulted him, and himself denounced punishments against the transgressors of his laws. This properly was the time of the theocracy, taken in its full extent; for God was not only considered as the divinity who was the object of their religious worship, but as the sovereign to whom the honours of supreme majesty were paid. The case was nearly the same under Joshua; who, being filled with the spirit of Moses, undertook nothing without consulting God. Every measure, both of the leader and of the people, was regulated by the direction of the Almighty, who rewarded their fidelity and obedience by a series of miracles, victories, and successes. After Moses had regulated every thing regarding the civil administration, and the marching of the troops, he led the Israelites to the confines of Canaan, to the foot of Mount Nebo. Here the Lord commanded him to ascend into the mountain; whence he showed him the promised land, whereinto he was not permitted to enter. He immediately after yielded up the ghost, without sickness or pain, in the 120th year of his age, and 1451 years before Jesus Christ.

Moses is incontestably the author of the first five books of the Old Testament, which go by the name of the Pentateuch; and which are acknowledged to be inspired, by the Jews and by Christians. Some, however, have denied that Moses was the author of these books; and have founded their opinion on this, that he always speaks of himself in the third person. But this manner of writing is by no means peculiar to Moses: it occurs also in several ancient historians; such as Xenophon, Cæsar, Josephus, &c. who, possessed of more modesty or good sense than some modern historians, whose egotism is altogether disgusting, have not like them left to posterity a spectacle of ridiculous vanity and self-conceit. After all, it is proper to observe, that profane authors have related many falsehoods and absurdities concerning Moses, and concerning the origin and religion of the Jews, with which they were but little acquainted. Plutarch, in his book concerning Isis and Osiris, says, that Judæus and Hierosolymus were brothers, and descended from Typhon; and that the former gave his name to the country and its inhabitants, and the latter to the capital city. Others say that they came from Mount Ida in Phrygia. Strabo is the only author who speaks any thing like reason and truth concerning them; though he too says that they were descended from the Egyptians, and considers Moses their legislator as an Egyptian priest. He acknowledges, however, that they were a people strictly just and sincerely religious. Other authors by whom they are mentioned seem not to have had the smallest acquaintance either with their laws or their worship. They frequently confound them with the Christians, as is the case with Juvenal, Tacitus, and Quintilian.

MOSHEIM (John Lawrence), a learned German divine, was born in 1695, and acquired so much fame by his talents as to be invited to several universities. He settled at Gottingen, of which he was chosen chancellor, and died there in 1755. He translated Cudworth's Intellectual System into Latin; but his greatest work is his Ecclesiastical History, which has been translated into English by Dr. Maclaine.

MOSQUE, a temple or place of religious worship among the Mahometans.

All mosques are square buildings, generally built with stone; before the chief gate there is a square court, paved with white marble, and low galleries round it, whose roof is supported by marble pillars. In these galleries the Turks wash themselves before they go into the mosque. In each mosque there are a great number of lamps; and between these hang many crystal rings, ostriches' eggs, and other curiosities, which, when the lamps are lighted, make a fine shew. As it is not lawful to enter the mosques with shoes or stockings on, the pavements are covered with pieces of stuff

sewed together, each being wide enough to hold a row of men kneeling, sitting, or prostrate. The women are not allowed to enter the mosques, but stay in the porches without. About every mosque there are six high towers, called minarets, each of which has three little open galleries, one above another: these towers, as well as the mosques, are covered with lead, and adorned with gilding and other ornaments; and from thence, instead of a bell, the people are called to prayer by certain officers appointed for that purpose. Most of the mosques have a kind of hospital belonging to them, in which travellers, of what religion soever, are entertained during three days. Each mosque has also a place called tarbé, which is the burying-place of its founders; within which is a tomb six or seven feet long, covered with green velvet or satin, at the ends of which are two tapers, and round it several seats for those who read the koran, and pray for the souls of the deceased.

MOSQUITO SHORE, a country of New Spain, on the Atlantic Ocean. It extends eastward from Point Castile, the boundary dividing it from the bay of Honduras, to Cape Gracios-a-Dios, 87 leagues; and southward, from Cape Gracios-a-Dios to St. John's river, 94 leagues. The interior part of the country is bounded by the lake Nicaragua, and fenced by mountains stretching to the west. In magnitude it exceeds Portugal; is well watered by navigable rivers and lakes; abounds in fish, game, and provisions of all sorts; furnishes every necessary for raising cattle and stock, on plantations of every kind and to any extent; and is clothed with woods producing timber for every purpose at land or sea. The soil is superior to that of the West India islands; the air and climate are more salubrious; and the destructive ravages of hurricanes and earthquakes have never been known here. The Mosquito Indians are so situated between morasses and inaccessible mountains, and a coast full of rocks and shoals, that no attempts against them by the Spaniards, whom they mortally hate, could ever succeed. Nevertheless they are a mild and inoffensive people, of great probity, and will never trust a man who has once deceived them. They had so great veneration for the English, that they spontaneously put themselves under the protection of the crown of Great Britain. This was first done when the duke of Albemarle was governor of Jamaica; and the king of the Mosquitos received a commission from his grace, under the seal of that island; after which time, they were not only steady in their alliance with the English, but warm in their affection, and very useful to them on many occasions. But the connexion between the English and the Mosquitos no longer subsists. By a convention with Spain, in 1786, the English, in consideration of certain cessions on the coast of Honduras, agreed to evacuate this country totally: and it is now a province of Spain. See HONDURAS.

MOSS on trees, in gardening. The growth of large quantities of moss on any kind of tree is a distemper of very bad consequence to its increase, and much damages the fruit of the trees of our orchards. The present remedy is the scraping it off from the body and large branches by means of a kind of wooden knife that will not hurt the bark, or with a piece of rough hair cloth, which does very well after a soaking rain. But the most effectual cure is the taking away the cause. This is to be done by draining off all the superfluous moisture from about the roots of the trees, and may greatly be guarded against in the first planting of the trees, by not setting them too deep.

If trees stand too thick in a cold ground, they will always be covered with moss; and the best way to remedy the fault is to thin them. When the young branches of trees are covered with a long and shaggy moss, it will utterly ruin them; and there is no way to prevent it but to cut off the branches near the trunk, and even to take off the head of the tree if necessary; for it will sprout again: and if the cause be in the mean time removed by thinning the plantation, or draining the land and stirring the ground well, the young shoots will continue clear after this.

If the trees are covered with moss in consequence of the ground's being too dry, as this will happen from either extreme in the soil, then the proper remedy is the laying mud from the bottom of a pond or river pretty thick about the root, opening the ground to some distance and depth to let it in, this will not only cool it, and prevent its giving growth to any great quantity of moss, but it will also prevent the other great mischief which fruit-trees are liable to in dry grounds, which is the falling off of the fruit too early.

The mosses which cover the trunks of trees, as they always are freshest and most vigorous on the side which points to the north, if only produced on that, serve to preserve the trunk of the tree from the severity of the north-winds, and direct the traveller in his way, by always plainly pointing out that part of the compass.

Moss is also a name given by some to the boggy ground in many parts of England, otherwise called a fen and bog.

Moss (Robert), an English divine, was born at Gillingham, in Norfolk, in 1666, and educated at Norwich school, from whence he removed to Bennet college, Cambridge, of which he was chosen fellow in 1685. In 1698 he became preacher to the society of Gray's-inn. He was created D.D. when queen Anne visited Cambridge in 1707, at which time he was one of her chaplains. In 1712 he was preferred to the deanery of Ely. He died in 1729. Dr. Moss was the author of eight volumes of sermons, and some tracts.

Moss, a town of Norway, in the province of Aggerhuys, on the E. side of Christiania Bay, 15 miles N. of Frederickstadt, and 28 S. of Christiania. Lon. 10. 48 E. Lat. 58. 38 N.

To Moss. *v. a.* (from the noun.) To cover with moss (*Shakspeare*).

MOSSES, in botany. See Musci.

MO'SSINESS. *s.* (from *mossy.*) The state of being covered or overgrown with moss (*Bacon*).

MO'SSY. *a.* (from *moss.*) Overgrown with moss; covered with moss (*Pope*).

MOST. *a.* the superlative of *more.* (mæſt, Saxon.) Consisting of the greatest number; consisting of the greatest quantity (*Arbuthnot*).

Most. *ad.* 1. In the greatest degree (*Locke*). 2. The particle noting the superlative degree: as, *the* most *wise.*

Most. *s.* 1. The greatest number (*Addison*). 2. The greatest value (*L'Estrange.*) 3. The greatest degree; the greatest quantity; the utmost (*Bacon*).

MO'STIC. *s.* A painter's staff (*Ains.*).

MO'STLY. *ad.* (from *most.*) For the greatest part (*Bacon*).

MOSTRA, in the Italian music, a mark at the end of a line or space, to show that the first note of the next line is in that place: and if this note be accompanied with a sharp or flat, it is proper to place these characters along with the mostra.

MOTACILLA. Warbler. In zoology, a genus of the class aves, order passeres. Bill subulate, straight; the mandibles nearly equal, nostrils oboval; tongue lacerate at the end.

This is a very extensive genus of birds; comprising not fewer than a hundred and ninety-three species, scattered over the globe; a very great number of which are natives of Europe, and many of them of our own country. We shall first give a catalogue of those most worthy of notice, dividing them as nearly as we can into tribes, and shall then subjoin such particulars concerning a few of them as may be most instructive or entertaining.

1. M. phœnicurus. Red-start. Common to our own country. Three varieties.

2. M. luscina. Nightingale. Common to Europe, Asia, and Africa. Three varieties; one with the body entirely white; one of more than ordinary size.

3. M. modularis. Hedge-warbler. Hedge-sparrow. Common to Europe.

4. M. silvatica. Wood-wren. Inhabits our own country.

5. M. hortensis. Petty-chaps. Inhabits France and Italy.

6. M. sylvia. White-throat. Inhabits England, and Europe generally. Two varieties, from variety of colours.

7. M. nævia. Fig-eater. Inhabits Italy: feeds on figs and grapes; whence its specific name.

8. M. alba. White-wagtail. Inhabits England, and Europe generally. Three varieties, from variety of colour. The tribe wagtail includes twenty or more than twenty distinct species of this genus, distinguished into pied, cinereous, green, &c. wag-tails; or else into Indian, African, &c. from their native habitations.

9. M. oenanthe. Wheat-ear. Inhabits England, and Europe in general, as also Asia and Africa. The wheat-ear tribe embraces ten or eleven varieties of the genus.

10. M. rubetra. Whin-chat. Inhabits Europe. The tribe of whin-chats comprise three or four varieties of the genus.

11. M. rubicola. Stone-chat. Moor-titling. Inhabits England, Siberia, and is found in Europe in general.

12. M. atricapilla. Black-cap. Inhabits England, and Europe generally. Four varieties, from variations in its colours.

13. M. magna. Dark-warbler. The tribe of warblers peculiarly so called are common to tropical and other warm climates, and comprise not less than a hundred varieties of the present genus. Not one of them is found native in our own country.

14. M. atrata. Black-red-tail. The red-tail tribe comprises four species, of which one inhabits Europe, the others South America.

15. M. rubecola. Robin-red-breast. Inhabits England, and Europe generally. Three varieties: the common, grey, with throat and breast ferruginous: a second, entirely white; the third with chin white, wing-coverts and feathers variegated.

16. M. Troglodytes. Wren. Inhabits England, and Europe at large; found also in Asia. The tribe comprises six species of the genus.

Of this selection we have only space to describe more particularly the following:

I. M. phœnicurus. Red-start. Though this bird has been described among the nightingale tribe by some naturalists, and in France is known by the same name, rossignolle de muraille, yet it is considerably inferior both in extent and variety of voice; and it differs still more widely in its colour, form, and manners. It is also inferior in point of size, being even smaller than the red-breast; while its shape is longer and more slender. But what most remarkably distinguishes this bird is a large black patch upon the fore part of the neck, which reaches up as far as the eyes and bill. The top of the head, the hind part of the neck, and the back, are of a deep but shining grey. The wings are of a dusky black, and the breast, under the patch of black already noticed, shines with a fine igneous red, growing more and more faint towards the flanks and belly, which are of a white colour.

This species makes its appearance in spring, along with the other summer birds. It commonly alights upon old towers and uninhabited houses, choosing always the highest and most inaccessible pinnacles. It is found, too, in the most impenetrable recesses of dark woods, where it indulges, undisturbed, its solitary habits, and utters its plaintive notes.

The red-start nestles in the holes of those old walls which it frequents, or in the hollow of a rotten tree, and, sometimes, in the cliff of a rock. The young ones are excluded in the month of May: they are five or six in number. While the female is employed in hatching and rearing them, the male is commonly stationed, as a centinel, upon a point of the rock, or upon the top of the wall, whence he utters his uninterrupted song; a pledge to the mother, that no danger is approaching her family. It is only when taken young that the red-start will acquire any familiarity with man; for, though this bird be frequently a near neighbour of the human race, he still preserves his native wildness and timidity. He acquires neither the confidence and intimacy that distinguish the red-breast, the gaiety of the lark, nor the vivacity of the nightingale. His disposition is melancholy, and his manners wild. If taken when old, he refuses all food, preferring death to captivity; or, if he survive his freedom, his obstinate silence and sullen grief plainly indicate how deeply he is penetrated with the misery of his condition.

II. M. luscinia. Nightingale. This bird, the most celebrated of all the feathered race, for its song, visits England as early as the month of April, and takes its departure in August; but is never found to migrate so far north as Scotland, or west as Cornwall and Wales. Though the climate of Sweden be more severe, it annually visits that kingdom, by the accounts of Linnéus. So various, sweet, and continued are the notes of this bird, that the songs of the other warblers, taken in their utmost extent, appear despicable when compared with those of the nightingale. His variety seems inexhaustible; for he never repeats the same notes a second time, at least servilely; and if the same bar be heard twice, it is always upon a different key, and with new embellishments. This great Chorypheus of the spring, as often as he prepares to conduct the hymn of Nature, begins by feeble, timid, and indecisive tones, as if to try his instrument. By degrees, he assumes more confidence, becomes gradually more warm and animated, till, at last, like the ancient musicians, he captivates and overwhelms his audience, by the full exertion of his astonishing powers. These qualities of the nightingale were not unknown to the ancients; and Pliny has given an admirable description of them in his tenth book, where he mentions the spirit of emulation which it displays in song; and observes that two of them will continue to carry on an obstinate contest for victory, till the vanquished bird drops breathless to the ground. *Victa morte finit sæpe vitam, spiritu prius deficiente quam cantu.*

In England, the nightingales frequent thick hedges, and low coppices, and generally keep in the middle of the bush; so that they are very rarely seen. They begin their song in the evening, and continue it the whole night. Perhaps somewhat of their fame is owing to this circumstance: during the solemn stillness of night, when all the animals are at rest, every sound is heard with advantage, and has, amidst darkness, a more powerful effect upon the imagination. These vigils did not escape the notice of the Mantuan poet, who thus describes them:

Qualis populea mœrens philomela sub umbrâ,
Amissos queritur fœtus, quos durus arator
Observans nido implumes detraxit: at illa
Flet noctem, ramoque sedens, miserabile carmen
Integrat, et mœstis latè loca questibus implet.
GEORG. iv. l. 511.

As Philomel in poplar shades, alone,
For her lost offspring pours a mother's moan;
Which some rough plowman marking for his prey,
From the warm nest, unfledged, hath dragg'd away;
Perch'd on a bough, she all night long complains,
And fills the grove with sad repeated strains.
WARTON.

Though the nightingale be a very small bird, his voice is heard farther than the human; being distinguished, in a calm night, at the distance of almost a mile all around the bush where he sits. When tamed, he sings for nine months in the year; a circumstance, from which we may conclude, that it is with no intention to sooth the toils of the female during incubation. In fact, the female hatches because she is prompted to that function by a passion, perhaps stronger than that of love; and seems to feel in it an inward joy, which renders her independent of all consolation. The warbling of the male is, in like manner, the result neither of duty nor of prudential considerations: it is the natural and unavoidable expression of the sexual passion; a passion which gratification no sooner extinguishes, than the gift of song is lost, and the pretended solace of the female is at an end. From the end of June, the nightingale ceases to sing: his voice becomes then more like the croaking of a toad than that of the tuneful philomel we have described.

The nightingale's talents for speaking are reported to be equal, if not superior, to his musical ones. Gesner gravely mentions two kept at Ratisbon by the landlord of an inn, that spent whole nights in adjusting the political interests of Europe. Germannicus and Drusus, the two sons of Claudius, are said, by Pliny, to have educated one so liberally, that he delivered orations both in Greek and Latin. Hist. Nat. x. 42.

This bird's fame for music is often fatal to its liberty. In order to secure its song, it is frequently made a prisoner; and the greatest part of what is written upon the subject, is with a view to instruct its tyrants how to perpetuate its slavery.—The nightingale is about six inches from the tip of the bill to that of the tail. Its colours are very plain, the head and back being of a pale tawny colour, dashed with olive; the throat, breast, and upper part of the belly, of a light ash-colour; the lower part of the belly almost white. The wings and tail are of a tawny red.

III. M. rubecola. Robin-red-breast. The little birds, of this name, on account of their near approaches to our dwellings, and their familiarity with man, are, perhaps, the best known of all the feathered race, except such as are kept in domestication. They are capable of enduring the most severe winters in this island; but, at the approach of such inclement seasons, they leave the woods, where they reside in summer, and are willing to acknowledge a kind of dependence upon man. It is then that they enter the orchards of the farmer, and establish themselves in some hedge, or unoccupied house; making frequent calls at the kitchen-door, during the continuance of frost, in order to pick up any crumbs and fragments that have been dropped there, before they are destroyed or congealed by the frost. Many of them have been fed from the window during the whole season: some intrust themselves even within the room; and it is seldom that they repent of this confidence; for they are universal favourites, and, almost always, meet with that generous treatment which their wants or their trust in the human race so well merit.

It is remarkable, that a bird which remains in North Britain all the year round should migrate from France, during the winter months. Such, however, is the case: in France the red-breast frequents the hedges and dwelling-houses, for a short time, in autumn and spring; but regularly, in the dead of winter, when the hard frost commences, disappears. In his spring visit, he makes but a short stay, hasting, as he then is, to enter the forest, that he may there, amidst the spreading leaves, enjoy solitude and love.

The red-breast builds its nest at the foot of some thick shrub, or upon a tuft of grass, able to support it. The materials of which it is composed are oak-leaves, moss, and a bed of feathers within. Sometimes, after the edifice is finished, the bird covers it entirely over with leaves, allowing only

a small passage to remain, sufficient to admit its body.

During the season of nestling and incubation, the male makes the grove resound with his soft and melodious lays. His warbling is soothing and tender, animated occasionally with notes of a louder tone, and sometimes, too, graced with those touching and engaging accents, that seem to express the ardour of his love. In the sweet society of his female, he seems to be wholly absorbed: at the interference of other company, he becomes fretful and enraged; for no stranger is permitted to intermeddle with his joy: even those of his own species he pursues with rage, till he banishes them from the district he has chosen for himself. His love exhibits a strange mixture of jealousy and attachment.

The food of the red-breast varies with the season. In spring, he feeds upon insects and worms, which he pursues with address and nimbleness, in those moist and shady districts where he then resides. In autumn, he devours all kinds of seeds and fruits that are produced in the district, not excepting the apple and the grape.

There is no bird more active, none satisfied with a smaller portion of rest, than this bird: he is the first that appears in the woods at the break of day, and the last that retires thither in the evening to enjoy repose. This species is spread over the whole of Europe, from Norway and Sweden, to the coast of the Mediterranean.

IV. M. Troglodytes. Wren. The ancients gave this small bird the name of Troglodyte, from a fancied resemblance between its manners and those of a race of men who were said to inhabit dens and caves of the earth. There is some difference among naturalists, in classing and distinguishing the tribe of wrens; a circumstance that might be expected in subjects so minute, and so slightly discriminated by nature. The common wren is known from its residence. It frequents farm-houses, and country villages, where it is seen hopping about, full of life and vivacity, even in the midst of winter, expressing, towards evening, its happiness in cheerful and well-toned notes. It appears upon the top of heaps of fire-wood, or by the sides of old walls, whence it disappears in a moment, by making its way into some small hole. It remains not, however, long concealed; but returns to make quick and inconstant movements with its little tail, always raised in an almost perpendicular direction.

The flights of the wren are very short, and expeditious. When flying, it moves its wings with such rapidity, that they become invisible. Its length is about three inches and a half, and its breadth, when the wings are extended, five. The whole plumage is transversely barred with undulating lines of brown and black; on the belly and lower parts it inclines to grey.

This bird, slender as it is in form, is almost the only one that remains with us during the most severe winter; and it is the only one of the whole feathered creation which continues its warbling in a season, in which the universal silence of the woods and groves is interrupted only by the croaking of ravens. During a fall of snow it is still better heard; for then it enters the court-yards, the door of the stable or dairy, seeking, among the garbage, for the dead bodies of insects, or their larves.

V. M. sutoria. Tailor-bird. Tailor-wren. This is a very small yellow bird, about three inches long, and weighs only three-sixteenths of an ounce. It inhabits India, and constructs a very curious nest by sewing the edges of one or more leaves together, so as to form a conical repository for its eggs and young, which it lines afterwards with feathers and vegetable down: this singular work is performed by using the bill instead of a needle, and by employing vegetable fibres for thread. The eggs are white, and are said to be not larger than what are usually called ants-eggs.

VI. M. oenanthe, or wheat ear, is distinguished by its hoary back; its front, line above the eyes, rump and base of the tail white; through the eyes a black band. The distribution of these colours vary however so as to produce four or five varieties. The bird is met with as far north as Greenland, and as far east as India. It visits England annually in the beginning of March, and leaves us in September. It chiefly frequents heaths, warrens, and the edges of hills; feeds on insects, particularly earth-worms; grows prodigiously fat, and breeds in rabbits burrows, or under a stone. The eggs are from five to eight in number, of a light blue, with a deep blue circle at the large end: the young are hatched in the middle of May. In some parts of England these birds are very plentiful. About East-Bourne, in Sussex, they are taken in snares made of horse hair, placed beneath a long turf; being very timid, the motion of a cloud, or the appearance of a hawk, will drive them for shelter into these traps. The numbers annually ensnared in the neighbourhood of East Bourne are said to amount to eighteen hundred and forty dozen; and they are usually sold at sixpence a dozen: the smaller are eaten in the country, the larger are selected for the London market, and when potted by the poulterers are by many as much esteemed as the ortolan on the continent.

VII. M. cyanea. Superb warbler. This bird is one of the most beautiful of the whole genus. It is five and a half inches long, black-blue, beneath white; feathers of the head long; lax turgid; front, cheeks, and lunula on the neck fine blue. There is another variety, from a different disposition of the colours. The female is brown above, beneath white; blue round the eyes. It is an inhabitant of New Holland, the second variety, of Manilla.

We cannot conclude this short history of the genus motacilla or warblers without observing that there are some circumstances attending the singing of birds which seem highly flattering to man; circumstances that may lead him to imagine, that their musical endowments are conferred upon them chiefly to promote his pleasure. While the canopy of the sky, the expanse of the ocean, and the verdure of the fields, are fitted to give delight to one of his senses, the harmony of the feathered tribe seems equally calculated to sooth and captivate another; and it may therefore, with the same propriety, be adduced as a proof of the goodness and munificence of the Great Parent of the human race.

In support of this pleasing illusion, if such it be, let us observe, that, in general, the musical birds reside in the vicinity of man, and are rarely found in the uninhabited parts of the earth. While a solemn silence reigns in the depth of the forest, and in the barren wild, every cottage, as you approach the cultivated plains, is honoured with the visits, and charmed with the melody of the singing birds. Often has the bewildered traveller, in the dreary tracts of South America, conceived his first hopes of safety from hearing the notes of the

musical birds, and been conducted, by a band of songsters, to the habitation of his fellow-creatures. On the other hand, the silent birds, and such as have harsh and disagreeable voices, generally inhabit the inaccessible wilds, the gloomy forest, or the distant parts of the ocean. There their screaming notes overcome the noise of the winds and water, and prevent them from being dispersed from each other amidst the fury of these tempestuous elements.

Further, it is not often, that those birds which are capable of imitating sounds are possessed of what may be called a taste for music.—They have no predilection for melodious notes; but will imitate the harshest screams as readily as the finest air. They seem, in a great degree, insensible to the effect of their own powers, and the charms which they possess; for it does not appear that the birds of one species are delighted with the warblings of those of a different. Man, however, derives pleasure from them all; a pleasure which never rises higher than when it is produced by the combined effect of every note in the grove.

MOTATION. *s.* Act of moving.

MOTE. *s.* (mot, Saxon.) A small particle of matter; any thing proverbially little (*Bacon*).

MOTE, for *might*, or *must* (*Spenser*).

MOTE, MOTA. (Fr. *mot*, a word.) Discussion, debate. It is a word which frequently occurs, in our ancient customs, for a meeting, court, or plea. The term is still retained in law under the form of MOOT.

Of motes, by the Saxons also called gemotes, considered in the sense of assemblies, or courts, there were divers kinds; as wittenagemote, folkegemote, schiregemote, hundredgemote, burgemote, wardegemote, haligemote, swainegemote, &c. See each under its proper article, WITTENAGEMOTE, FOLKEGEMOTE, &c.

MOTE, *mota*, was also used for a fortress, or castle; as, mota de Windsor, &c.

MOTE also denoted a standing water to keep fish in; and sometimes a large ditch encompassing a castle, or dwelling-house.

MOTETTO, in the Italian music, a kind of church-music, composed with much art and ingenuity from one to eight parts, with or without instruments, usually accompanied with a thorough bass. When the composer gives a loose to his fancy, without confining himself to any rules, subjects or passions, it is called fantasia or ricercata. The word is sometimes used for pieces made to hymns to saints, &c. and whole psalms are often thus called; and was probably derived from *motus*, motion, because the church songs were designed to move the hearts of the hearers; or because this kind of composition was originally of a very gay and lively nature.

MOTH, in entomology. See PHALÆNA.

MOTHER. *s.* (moðoꞃ, Saxon.) 1. A woman that has borne a child; correlative to son or daughter (*Shakspeare*). 2. That which has produced any thing (*Arb.*). 3. That which has preceded in time: as, *a* mother *church to chapels*. 4. That which requires reverence and obedience (*Ayliffe*). 5. Hysterical passion (*Graunt*). 6. A familiar term of address to an old woman. 7. (*moeder*, Dutch.) A thick substance concreting in liquors; the lees or scum concreted (*Dryden*).

MO'THER. *a.* Had at the birth; native: as, *mother* wit (*Shakspeare*).

To MO'THER. *v. n.* To gather concretion (*Dryden*).

MO'THER-IN-LAW. *s.* The mother of a husband or wife (*Matthew*).

MOTHER OF PEARL. The beautiful white and irridescent enamel that lines the interior of the shell of the mytilus margaritiferus, or mother of pearl mussel, (see MYTILUS): the shell being thus denominated from its generating this elegant lining. This shell grows to a very considerable size, is of a flattened and rounded shape, with the back or hinge-part straight. From this cartilaginous hinge, when in a petrified state, is very rare and beautiful extraneous fossil called the astrodamas (helmintholithus astrodamas of Linneus); which when cut and polished, in the disposition of its fibres, and in its colours, bears some resemblance to the eye of a peacock's feather.

Mother of pearl is also sometimes obtained from the shells of some species of the mya, and of the oyster, but by far the best specimens are obtained from the mother of pearl mussel-shell. It is occasionally found, however, in the haliotis iris, and turbo olearius, but the membranaceous parts of these shells are more compact and dense than those of the mytilus margaritiferus.

These shells, when deprived of their hardening substance, or carbonat of lime, by an acid menstruum, appear to be formed of various membranes applied *stratum super stratum*. Each membrane has a corresponding coat, or crust of carbonat of lime, which is so situate that it is always between every two membranes, beginning with the epidermis, and ending with the last formed internal membrane. The animals which inhabit these stratified shells increase their habitation by the addition of a stratum of carbonat of lime, secured by a new membrane; and as every additional stratum exceeds in extent that which was previously formed, the shell becomes stronger in proportion as it is enlarged, and the growth and age of the animal is denoted by the number of the stratum which concur in forming the shell.

For the chemical properties of mother of pearl, see the article CONCHOLOGY.

MOTHER OF THYME. See THYMUS.

MOTHERHOOD. *s.* (from *mother.*) The office or character of a mother (*Donne*).

MOTHERLESS. *a.* (from *mother.*) Destitute of a mother (*Waller*).

MOTHERLY. *a.* (*mother* and *like.*) Belonging to a mother; suitable to a mother (*Ral.*).

MO'THERLY. *ad.* (from *mother.*) In manner of a mother (*Donne*).

MOTHERY. *a.* (from *mother.*) Concreted; full of concretions; dreggy; feculent.

MOTHMU'LLEIN. *s.* (*blatteria*, Latin.) A plant (*Miller*).

MOTHY. *a.* (from *moth.*) Full of moths.

MOTION. *s.* (*motio*, Latin.) 1. The act of changing place (*Milton*). 2. Manner of moving the body; port; gait (*Waller*). 3. Change of posture; action (*Dryden*). 4. Agitation; intestine action (*Gay*). 5. Direction;

tendency (*Milton*). 6. Impulse communicated (*Dryden*). 7. Tendency of the mind (*South*). 8. Proposal made (*Shakspeare*.)

To Mo'tion. *v. a.* (from the noun.) To propose.

Motion, primarily so called, or local motion, has been defined a continued and successive change of place; or that state of a body, whereby it corresponds successively to several different places, or is present successively in different parts of space.

In this sense, the doctrine and laws of motion make the subject of mechanics, or dynamics.

The ancient philosophers considered motion in a more general and extensive manner; they defined it a passage out of one state into another; and thus made six kinds of motion, viz. creation, generation, corruption, augmentation, diminution, and lation, or local motion.

Some of the later schoolmen reduce these six kinds of motion to four: the first is general, including any passage from one state to another; under which kind come creation, production, and mutation. The second is a passage of something already existing from one state to another; and thus generation is a motion. The third is a successive passage of something already existing from one term to another; and thus alteration, and accretion, are species of motion. The last is lation, or local motion; and thus walking is motion.

But the latest philosophers deny any other species besides local motion; and reduce all the sorts above-mentioned to this one. So that we have here only to do with lation, or local motion; whereof the rest are only so many different determinations, or effects.

Physical writers, both ancient and modern, have ever been perplexed about the nature and definition of local motion. The Peripatetics define it by, *Actus entis in potentia, prout in potentia*, Arist. 3. Phys. cap. 2. but this notion seems too abstract and metaphysical for our days, and is of no use in explaining the properties of motion.

The Epicureans explain motion by the migration of a body, or a part of a body from one place to another; on which definition the later Epicureans refine, and call it, the migration or passage of a body from space to space; thus substituting the word space for that of place.

The Cartesians define motion, a passage or removal of one part of matter out of the neighbourhood of those parts immediately contiguous thereto, into the neighbourhood of others.

Which definition agrees, in effect, with that of the Epicureans: all the difference between them consisting in this; that what the one call body, and place, the other call matter, and contiguous parts.

Borelli, and other late writers after him, define motion more accurately and fully, the successive passage of a body from one place to another, in a determinate time, by becoming successively contiguous to all the parts of the intermediate space.

Motion, then, is agreed to be the translation of a body from place to place; but authors differ much when they come to explain wherein this translation consists. And hence their divisions of motion become exceedingly precarious. Aristotle, and the Peripatetics, divide all motion into natural and violent.

Motion (Natural), is that which has its principle, or moving force, within the moving body. Such is that of a stone falling towards the centre of the earth.

Motion (Violent), is that whose principle is without, and against which the moving body makes a resistance. Such is that of a stone thrown upwards.

The moderns generally divide motion into absolute and relative.

Motion (Absolute), is the change of absolute place, in any moving body; whose celerity, therefore, will be measured by the quantity of absolute space which the moveable body runs through.

Motion (Relative), is a mutation of the relative or vulgar place of the moving body; and has its celerity estimated by the quantity of relative space run through.

A late acute writer, Mr. Young, defines motion, change of place; and as he endeavours to obviate the principal objections to this definition, we shall quote part of his defence. "It is said (he observes) by some, that change implies motion, and therefore cannot be a part of its definition, being the very thing defined. To this I answer, We are speaking of the sensible idea of motion, as it appears to our sight; now changes do appear to our view, and to all our senses, which give us no idea of motion. Changes in heat or cold; in colour, flavour, smell, sound, hardness, softness, pain, pleasure; in these, and many other ideas, changes do not produce ideas like that produced by a ball rolling or a stone falling. We may, perhaps, ultimately trace them to motion, but to insensible motions: to motions which arise only in reflection, and constitute no part of the actual idea of change. We can, therefore, conceive of change, without conceiving at the same time of motion. Change is a generic idea, including many species; motion, as a sensible idea, is a species of that genus. Change is therefore a necessary part of the definition of motion; it marks the genus of the thing defined. Motion is a change; but as there are many species of change, which of those species is motion? The answer, It is a change of place. This marks the species; and distinguishes it from change of colour, of temperament, and figure."

This is the ablest defence of an attempt to define motion that we have ever seen; and at first view the definition itself appears to be perfect. Aristotle, the prince of definers, "considers a definition as a speech declaring what a thing is. Every thing essential to the thing defined, and nothing more, must be contained in the definition. Now the essence of a thing consists of these two parts; first, what is common to it with other things of the same kind; and secondly, what distinguishes it from other things of the same kind. The first is called the genus of the thing; the second, its specific difference. The definition, therefore, consists of those two parts."

In obedience to this rule, the definition under consideration seems to consist of the genus, signified by the word change; and of the specific difference, denoted by the words of place. But does the speech change of place really declare what motion is? We cannot admit that it does; as, in our apprehension, a change of place is the effect of motion, and not motion itself. Suppose a lover of dialectics undertaking to define the stroke by which he saw his neighbour wounded with a bludgeon; what should we think of his art were he to call it a contusion on the head? He might say that contusion is a general term, as contusions may be produced on the arms, on the legs, and on various parts of the body; and as there are many species of contusion, if he were asked which of those species was the stroke to be defined, he might answer, "a contusion on the head." Here would be apparently the genus and specific

difference; the former denoted by contusion, and the latter by the words on the head. But would this be a definition of a stroke? No, surely: a contusion on the head may be the effect of a stroke; but it can no more be the stroke itself, than a blow can be a bludgeon, or a flesh wound the point of a sword. Equally evident it is, that a change of place cannot be motion; because every body must have been actually moved before we can discern, or even conceive, a change of its place.

The act of changing place would perhaps come nearer to a definition of motion; but so far would it be from "a speech declaring what motion is," that we are confident a man who had never by any of his senses perceived a body in actual motion, would acquire no ideas whatever from the words, "act of changing place." He might have experienced changes in heat, cold, smell, and sound; but he could not possibly combine the ideas of changes with the signification of the word place, were he even capable of understanding that word, which to us appears to be more than doubtful.

The distinctions of motion into different kinds have been no less various, and no less insignificant, than the several definitions of it. The moderns who reject the peripatetic division of motion into four classes, yet consider it themselves as either absolute or relative. Thus we are told, as above, that "absolute motion is the change of absolute place, and that its celerity must be measured by the quantity of absolute space which the moving body runs through in a given time." "Relative motion, on the other hand, is a mutation of the relative or vulgar place of the moving body, and has its celerity estimated by the quantity of relative space run through."

Now it is obvious, that this distinction conveys no ideas without a farther explanation of the terms by which it is expressed; but that explananation is impossible to be given. Thus, before we can understand what absolute motion is, we must understand what is meant by absolute place. But absolute place is a contradiction; for all place is relative, and consists in the positions of different bodies with regard to one another. Were a globe in the regions of empty space to be put in motion by Almighty Power, and all the rest of the corporeal world to be soon afterwards annihilated, the motion would undoubtedly continue unchanged; and yet according to this distinction, it would be at first relative, and afterwards absolute. That the beginning of such a motion would be perceptible, and the remainder of it imperceptible, is readily granted; but on this account to consider it as of two kinds, is as absurd as to suppose the motion of the minute-hand of a clock to be affected by our looking at it. But we dare not dwell longer upon these distinctions.

Motion (Laws of). See Axioms and Dynamics.

Motion (Quantity of), whether always the same? The Cartesians maintained that the Creator at the beginning impressed a certain quantity of motion on bodies; and that under such laws, as that no part of it should be lost, but the same portion of motion should be constantly preserved in matter: and hence they conclude, that if any moving body strike on any other body, the former loses no more of its motion than it communicates to the latter. This principle sir Isaac Newton overturns in the following words: "From the various compositions of two motions, it is manifest there is not always the same quantity of motion in the world; for if two balls, joined together by a slender wire, revolve with an uniform motion about their common centre of gravity, and at the same time that centre be carried uniformly in a right line drawn in the plane of their circular motion, the sum of the motions of the two balls as often as they are in a right line, drawn from their common centre of gravity, will be greater than the sum of their motions when they are in a line perpendicular to that other. Whence it appears, that motion may be both generated and lost. But by reason of the tenacity of fluid bodies, and the friction of their parts, with the weakness of the elastic power in solid bodies, nature seems to incline much rather to the destruction than the production of motion; and in reality, motion becomes continually less and less. For bodies which are either so perfectly hard, or so soft, as to have no elastic power, will not rebound from each other: their impenetrability will only stop their motion. And if two such bodies, equal to each other, be carried with equal, but opposite motions, so as to meet in a void space, by the the laws of motion they must stop in the very place of concourse, lose all their motion, and be at rest for ever; unless they have an elastic power to give them a new motion. If they have elasticity enough to enable them to rebound with $\frac{1}{4}$, or $\frac{1}{2}$, or $\frac{3}{4}$, of the force wherewith they meet, they will lose $\frac{3}{4}$, or $\frac{1}{2}$, or $\frac{1}{4}$, of their motion. And this is confirmed by experiments: for if two equal pendulums be let fall from equal heights, so as to strike full on each other; if those pendulums be of lead, or soft clay, they will lose all, or almost all, their motion; and if they be of any elastic matter, they will only retain so much motion as they receive from their elastic power." If it be asked, how it happens, that motion being thus continually lost, should be continually renewed again; the same author adds, that it is renewed from some active principles, "Such as the cause of gravity, whereby the planets and comets preserve their motions in their orbits, and all bodies acquire a great degree of motion in falling; and the cause of fermentation, whereby the heart and blood of animals preserve a perpetual warmth and motion; the inner parts of the earth are kept continually warmed; many bodies burn and shine; and the sun himself burns and shines, and with his light warms and cheers all things;" (as also from the cause of elasticity, by which bodies restore themselves into their former figures) "for we find but little motion in the world, except what plainly flows either from these active principles, or from the command of the willer." The preservation of the same quantity of motion in the universe, was a principle laid down universally by Descartes; but has been found false, and holds true only in the same direction, which is thus expressed by sir Isaac Newton: "The quantity of motion, which is collected by taking the sum of the motions directed towards the same parts, and the difference of those that are directed to contrary parts, suffers no change from the action of bodies among themselves." Newt. Princip. lib. i. See ante.

Some philosophers, after Descartes, have supposed the preservation of the same force or *vis viva*. See the articles Force and Vis viva.

But this holds only in elastic bodies, when there is a shock; and hence those philosophers have been led to maintain, that all bodies were elastic, at least in their elements, and that an inflexible body was impossible, being repugnant to the law of continuity. See Dynamics.

Motion (Equable), is that by which the moving

body proceeds with exactly the same velocity or celerity; passing always over equal spaces in equal times.

The laws of uniform Motion are these: 1. The spaces described, or passed over, are in the compound ratio of the velocities, and the times of describing those spaces. So that, if V and v be any two uniform velocities, S and s the spaces described or passed over by them, in the respective times T and t:

$$\text{then is } S : s :: TV : tv,$$
$$\text{or } 20 : 12 :: 4 \times 5 : 3 \times 4;$$
$$\text{taking } T=4, t=3, V=5, \text{ and } v=4.$$

2. In uniform motions, the time is as the space directly, and as the velocity reciprocally; or as the space divided by the velocity. So that

$$T : t :: \frac{S}{V} : \frac{s}{v} \text{ or } :: Sv : sV.$$

3. The velocity is as the space directly, and the time reciprocally; or as the space divided by the time.

$$\text{That is, } V : v :: \frac{S}{T} : \frac{s}{t} \text{ or } :: St : sT.$$

Motion (Accelerated), is that which continually receives fresh accessions of velocity. And it is said to be uniformly accelerated, when its accessions of velocity are equal in equal times; such as that which is produced by the continual action of one and the same force, like the force of gravity, &c.

Motion (Retarded), is that whose velocity continually decreases. And it is said to be uniformly retarded, when its decrease is continually proportional to the time, or by equal quantities in equal times; like that which is produced by the continual opposition of one and the same force; such is the force of gravity in uniformly retarding the motion of a body that is thrown upwards.

The laws of motion, uniformly accelerated or retarded, are these:

1. In uniformly varied motions, the space, S or s, is as the square of the time, or as the square of the greatest velocity, or as the rectangle or product of the time and velocity.

$$\text{That is, } S : s :: T^2 : t^2 :: V^2 : v^2 :: TV : tv.$$

2. The velocity is as the time, or as the space divided by the time, or as the square root of the space.

$$\text{That is, } V : v :: T : t :: \frac{S}{T} : \frac{s}{t} :: \sqrt{S} : \sqrt{s}.$$

3. The time is as the velocity, or as the space divided by the velocity, or as the square root of the space.

$$\text{That is, } T : t :: V : v :: \frac{S}{V} : \frac{s}{v} :: \sqrt{S} : \sqrt{s}.$$

4. When a space is described, or passed over, by an uniformly varied motion, the velocity either beginning at nothing, and continually accelerated; or else beginning at some determinate velocity, and continually retarded till the velocity be reduced to nothing; then the space, so run over by the variable motion, will be exactly equal to half the space that would be run over in the same time by the greatest velocity if uniformly continued for that time. See Acceleration.

Motion (Perpetual), is a motion which is supplied and renewed from itself, without the intervention of any external cause.

The celebrated problem of a perpetual motion consists in the inventing a machine, which has the principle of its motion within itself; and is a problem that has employed the mathematicians for 2000 years; though none perhaps have prosecuted it with attention and earnestness equal to those of the present age. Infinite are the schemes, designs, plans, engines, wheels, &c. to which this long-desired perpetual motion has given birth.

But M. De la Hire has proved the impossibility of any such machine, and finds that it amounts to this; viz. to find a body which is both heavier and lighter at the same time; or to find a body which is heavier than itself. Indeed there seems but little in nature to countenance all this assiduity and expectation: among all the laws of matter and motion, we know of none yet that seem likely to furnish any principle or foundation for such an effect.

Action and re-action it is allowed are always equal; and a body that gives any quantity of motion to another, always loses just so much of its own; but under the present state of things, the resistance of the air, the friction of the parts of machines, &c. do necessarily retard every motion.

To continue the motion therefore either, first, there must be a supply from some foreign cause; which in a perpetual motion is excluded.

Or, 2dly, all resistance from the friction of the parts of matter must be removed; which necessarily implies a change in the nature of things.

Or, 3dly and lastly, there must be some method of gaining a force equivalent to what is lost, by the artful disposition and combination of mechanic powers; to which last point then all endeavours are to be directed: but how, or by what means, such force should be gained, is still a mystery.

The multiplication of powers or forces, it is certain, avails nothing; for what is gained in power is lost in time, so that the quantity of motion still remains the same. This is an inviolable law of nature; by which nothing is left to art, but the choice of the several combinations that may produce the same effect.

Motion, in astronomy, is peculiarly applied to the orderly courses of the heavenly bodies.

The motions of the celestial luminaries are of two kinds: diurnal, or common; and secondary, or proper.

Motion (Diurnal, or primary), is that with which all the heavenly bodies, and the whole mundane sphere, appear to revolve every day round the earth, from east to west. This is also called the motion of the primum mobile, and the common motion, to distinguish it from that rotation which is peculiar to each planet, &c.

Motion (Secondary, or proper), is that with which a star, planet, or the like, advances a certain space every day from the west towards the east. See the several motions of each luminary, with the irregularities, &c. of them under the proper articles, Earth, Moon, Star, &c.

Motion (Angular), is that by which the angular position of any thing varies. See Angular.

Motion (Horary), is the motion during each hour. See Horary.

Motion (Paracentric) of Impetus. See Paracentric.

Motion of Trepidation, &c. See Trepidation and Libration.

Motion (Muscular.) See Muscles.

Motion (Peristaltic.) See Peristaltic.

Motion, in the manage. A horse is said to have a good motion when he moves and bends his fore-legs with great ease and freedom upon the manage. But if a horse trot right out, and keeps his body straight and his head high, and bends his fore-legs handsomely, then to say he has a good motion im-

plies the liberty of the action of the fore-hand. See the articles ACTION, PROGRESSION, &c.

MO'TIONLESS. *a.* (from *motion*.) Wanting motion; being without motion (*Black*.).

MO'TIVE. *a.* (*motivus*, Lat.) 1. Causing motion; having motion (*Hooker*). 2. Having the power to move; having power to change place (*Wilkins*).

MOTIVE POWER or FORCE, is the whole power or force acting upon any body, or quantity of matter, to move it; and is proportional to the momentum or quantity of motion it can produce in a given time. To distinguish it from the accelerative force, which is considered as affecting the celerity only.

Mo'TIVE. *s.* (*motif*, French.) 1. That which determines the choice; that which incites the action (*Locke*). 2. Mover: not in use (*Shakspeare*).

MO'TLEY. *a.* Mingled of various colours.

MO'TOR. *s.* (*moteur*, Fr.) A mover (*Br*.).

MOTMOT, in ornithology. See MOMATUS.

MOTO. (Ital.) In music, a word applied adverbially to the manner or style of performing any composition; and signifying that it is to be sung or played with emphasis and agitation.

MOTO CONTRARIO. (Ital.) An expression applied to that progression of the different harmonic parts of a composition by which they move in opposite directions.

MOTORII OCULORUM. (*nervi motori*, so called from their office.) The third pair of nerves of the brain. They arise from the crura cerebri, and are distributed on the muscles of the bulb of the eye.

MO'TORY. *a.* (*motorius*, Latin.) Giving motion (*Ray*).

MOTOUALIS, a small nation of Syria, inhabiting to the east of the country of the Drusas, in the valley which separates their mountains from those of Damascus.

MOTTE (Anthony Houdart de la), an ingenious Frenchman, greatly distinguished by his writings in prose and verse, and by his literary contests with many eminent persons, was born at Paris in 1672. He wrote with very different success, no man having been more praised or more criticised than he was: his literary paradoxes, his singular systems in all branches of polite learning, and above all his judgment upon the ancients, which, like those of Perrault, were thought disrespectful and detracting, raised him up formidable adversaries. Racine, Boileau, Rousseau, and madam Dacier, were among the number of those who made it their business to avenge antiquity on a man who, with more wit than genius or learning, assumed a kind of dictatorial authority in the province of belles lettres. He became blind in the latter years of his life, and died in 1731. He wrote a great deal in epic poetry, tragedy, comedy, lyric, pastoral, and fables; besides a vast variety of discourses, critical and academical, in prose. A complete edition of all his works was published in 11 vols. 8vo, in 1754; though, as has been said of our Swift, his reputation had been better consulted by reducing them to three or four.

MO'TTO. *s.* (*motto*, Italian.) A sentence or word added to a device, or prefixed to any thing written (*Addison*).

To MOVE. *v. a.* (*moveo*, Latin.) 1. To put out of one place into another; to put in motion (*Job*). 2. To give an impulse to (*Decay of Piety*). 3. To propose; to recommend (*Davies*). 4. To persuade; to prevail on (*South*). 5. To affect; to touch pathetically; to stir passion (*Dryden*). 6. To make angry (*Shakspeare*). 7. To put into commotion (*Ruth*). 8. To incite (*Milton*). 9. To conduct regularly in motion (*Milton*).

To MOVE. *v. n.* 1. To be in a state of changing place (*Milton*). 2. To go from one place to another (*Shakspeare*). 3. To walk; to bear the body (*Dryden*). 4. To go forward (*Dryden*). 5. To change the posture of the body in ceremony (*Esther*).

MO'VEABLE. *a.* (from *move*.) 1. Capable of being moved; not fixed; portable (*Addis*.). 2. Changing the time of the year (*Holder*).

MOVEABLE FEASTS, are such as are not always held on the same day of the year or month; though they may be on the same day of the week. Thus, Easter is a moveable feast; being always held on the Sunday which falls upon or next after the first full moon following the 21st of March. See Philos. Trans. Numb. 240, p. 185. All the other moveable feasts follow Easter, keeping their constant distance from it; so that they are fixed with respect to it, though moveable through the course of the year. Such are Septuagesima, Sexagesima, Ash-Wednesday, Ascension-day, Pentecost, Trinity-Sunday, &c.

MO'VEABLES. *s.* (*meubles*, Fr.) Goods; furniture: distinguished from real or immoveable possessions, as lands or houses (*Shak*.).

MO'VEABLENESS. *s.* (from *moveable*.) Mobility; possibility to be moved.

MO'VEABLY. *ad.* (from *moveable*.) So as it may be moved (*Grew*).

MO'VELESS. *a.* Unmoved; not to be put out of the place (*Boyle*).

MO'VEMENT. *s.* (*mouvement*, French.) 1. Manner of moving (*Pope*). 2. Motion (*Pope*).

MOVEMENT, a term often used in the same sense with automaton. The most usual movements for keeping time, are clocks and watches: the latter are such as shew the parts of time by inspection, and are portable in the pocket; the former such as publish it by sounds, and are fixed as furniture.

MOVEMENT, in music, the name given to any single strain, or to any part of a composition comprehended under the same measure, or time. When an overture, concerto, song, or any other piece, changes its time and measure, either from one species to another, as from common-time to triple, or *vice versa*; or in the same species, as from triple-time, adagio, to triple-time, allegro, or the contrary; it is then said to change its movement: so that every composition consists of as many move-

ments as there are positive changes in the time or measure.

Movement, in military affairs, an evolution.

MO'VENT. *a.* (*movens*, Lat.) Moving (*Grew*).

Mo'vent. *s.* (*movens*, Latin.) That which moves another (*Glanville*).

MO'VER. *s.* (from *move*.) 1. The person or thing that gives motion (*Shakspeare*). 2. Something that moves, or stands not still (*Dryden*). 3. A proposer (*Bacon*).

MO'VING. *part. a.* Pathetic; touching; adapted to affect the passions (*Blackmore*).

Moving plants. See Hedysarum, Tremella, and Mimosa.

MO'VINGLY. *ad.* Pathetically; in such a manner as to seize the passions (*Addison*).

MOULD. *s.* (*moegel*, Swedish.) 1. A kind of concretion on the top or outside of things kept motionless and damp (*Bacon*). 2. (molð, Saxon.) Earth; soil; ground in which any thing grows (*Sandys*). 3. Matter of which any thing is made (*Addison*). 4. (*molde*, Spanish.) The matrix in which any thing is cast, or receives its form (*Black.*). 5. Cast; form (*Prior*). 6. The suture or contexture of the skull (*Ainsworth*).

Mould, or Mold, in the mechanic arts, &c. a cavity cut with a design to give its form or impression to some softer matter applied therein, of great use in sculpture, foundery, &c. The workmen employed in melting the mineral or metallic glebe dug out of mines, have each their several moulds to receive the melted metal as it comes out of the furnace; but these are different according to the diversity of metals and works. In gold-mines they have moulds for ingots; in silver-mines, for bars; in copper and lead mines, for pigs or salmons; in tin-mines, for pigs and ingots; and in iron-mines, for saws, chimney-backs, anvils, cauldrons, pots, and other large utensils and merchandizes of iron, which are here cast as it were at first hand.

Moulds, in the manufacture of paper, are little frames composed of several brass or iron wires, fastened together by another wire still finer. Each mould is of the bigness of the sheet of paper to be made, and has a rim or ledge of wood to which the wires are fastened; these moulds are more usually called frames, or forms.

Moulds for leaden bullets, are little iron-pincers, each of whose branches terminates in an hemispherical concavity, which, when shut, form an intire sphere; in the lips or sides where the branches meet, is a little jet or hole through which the melted lead is conveyed.

Moulds (Glazier's). The glaziers have two kinds of moulds, both serving to cast their lead. In the one they cast the lead into long rods or canes fit to be drawn through the vice, and the grooves formed therein; this they sometimes call ingot-mould. In the other they mould those little pieces of lead a line thick, and two lines broad, fastened to the iron-bars; these may be also cast in the vice.

Moulds, among plumbers, are the tables whereon they cast the sheets of lead. These they sometimes call simple tables; besides which they have other real moulds wherewith they cast pipes without soldering.

Moulds, used in basket-making, are very simple, consisting ordinarily of a willow, or osier, turned or bent into an oval, circle, square, or other figure, according to the baskets, panniers, hampers, hats, and other utensils intended. On these moulds they make or more properly measure all their work, and accordingly they have them of all sizes, shapes, &c.

Moulds, among tallow-chandlers, are of two kinds; the first for the common dipped candles, being the vessel wherein the melted tallow is disposed, and the wick dipped; this is of wood, of a triangular form, and supported on one of its angles, so that it has an opening of near a foot at top: the other, used in the fabric of mould candles, is of brass, pewter, or tin; here each candle has its several moulds. See Candle.

Mould, among gold-beaters, a certain number of leaves of vellum, or pieces of guts, cut square, of a certain size, and laid over one another, between which they put the leaves of gold and silver, which they beat on the marble with the hammer. They have four kinds of moulds, two whereof are vellum, and two of gut; the smallest of those of vellum consists of forty or fifty leaves, the largest contains an hundred; for the others, each contains five hundred leaves. The moulds have all their several cases, consisting of two pieces of parchment, serving to keep the leaves of the mould in their place, and prevent their being disordered in beating.

Mould, in ship-building, a thin flexible piece of timber, used by shipwrights as a pattern whereby to form the different curves of the timbers, and other compassing pieces in a ship's frame. There are two sorts of these, viz. the bend-mould and hollow-mould; the former of these determines the convexity of the timbers, and the latter their concavity on the outside, where they approach the heel, particularly towards the extremities of the vessel. The figure given to the timbers by this pattern is called their bevelling.

Mould, in botany. See Mucor.

Mould, in mineralogy. See Mucus. The best mould for vegetables is that which contains a large proportion of carbonaceous or vegetable matter, intermixed with some portion of animal mould, as of church-yards, or muck strongly impregnated with ammonia, which is an animal substance. Moulds vary much in their colour: there are hazel moulds, dark-grey, russet, ash, yellowish-red, and many besides. The first three colours are generally regarded as denoting the best qualities, and the last as the most unfriendly to the growth of vegetables.

For the purpose of the gardener, those moulds which are capable of working well at all seasons, are somewhat light and dry, perfectly mellow and fine in their particles. See Com-

POST, BOTANY, SOIL, and CONVERTIBILITY.

To MOULD. *v. n.* (from the noun.) To contract concreted matter; to gather mould (*Bac.*).

To MOULD. *v. a.* To cover with mould; to corrupt by mould (*Knolles*).

To MOULD. *v. a.* (from the noun.) 1. To form; to shape; to model (*Wotton*). 2. To knead: as, to *mould* bread (*Ains.*).

MO'ULDABLE. *a.* (from *mould.*) That may be moulded (*Bacon*).

MO'ULDER. *s.* (from *mould.*) He who moulds.

To MO'ULDER. *v. n.* (from *mould.*) To be turned to dust; to perish in dust (*Clarendon*).

To MO'ULDER. *v. a.* (from *mould.*) To turn to dust; to crumble (*Pope*).

MOULDINESS, a term applied to bodies which corrupt in the air, from some hidden principle of humidity therein; and whose corruption shews itself by a certain white down, or lanugo, on their surface, which, viewed through a microscope, appears like a kind of meadow, out of which arise herbs and flowers, some only in the bud, others full blown, and others decayed, each having its root, stalk, and other parts.

MOULDING, any thing cast in a mould, or that seems to have been so, though in reality it were cut with a chisel, or the ax.

MOULDINGS, in architecture, projectures beyond the naked wall, column, wainscot, &c. the assemblage of which forms corniches, doorcases, and other decorations of architecture.

MO'ULDWARP. *s.* (molꝺ and ƿeoꞃpan, Saxon.) A mole; a small animal that throws up the earth (*Walton*).

MO'ULDY. *a.* (from *mould.*) Overgrown with concretions (*Addison*).

MOULINET, a French term properly signifying a little mill, being the diminutive of *moulin*, mill.

It is used in mechanics to signify a roller, which, being crossed with two levers, is usually applied to cranes, capstans, and other sorts of engines of the like nature, to draw ropes, and heave up stones, timber, &c.

MOULINET is also a kind of turn-stile, or wooden cross, which turns horizontally upon a stake fixed in the ground; usually placed in the passages to keep out horses, and to oblige passengers to go and come one by one.

These moulinets are often set near the outworks of fortified places, at the sides of the barriers, through which people pass on foot.

MOULINS, a town of France, and capital of the department of the Allier. Before the revolution, it was the capital of the Bourbonnois, and is esteemed one of the pleasantest towns in France; it is situated on the Allier; the streets are broad and clean. The principal trade is cutlery. Near it is a medicinal spring: thirty-five posts and three quarters S.S.E. Paris. Lon. 3. 25 E. Lat. 46. 34 N.

MOULTAN, one of the most ancient cities of Hindustan Proper, capital of a province of the same name. It is of small extent for a capital, but strongly fortified, and has a Hindu temple of great celebrity. Here is a particular sect of Hindus, called Catry; a tribe of warriors supposed to be the Catheri or Cathei, with whom Alexander warred on the banks of the Malli. Moultan is seated on one of the branches of the Indus, 210 miles S.W. of Lahore, and 310 S.E. of Candahar. Lon. 70. 40 E. Lat. 29. 52 N.

To MOULT. *v. n.* (*muyten*, Dutch.) To shed or change the feathers; to lose feathers (*Suckling*).

MOULTING, a periodical change of plumage in birds. The term is also very appropriately used by Mr. Clark, of Edinburgh, to denote that natural process by which horses and other quadrupeds cast their hair. We shall follow that judicious writer in our remarks on this subject.

Horses, towards the end of autumn and beginning of winter, exhibit signs of some particular change about to take place in their constitutions; and this, at the same time, is attended with a degree of faintness or weakness mostly observed at that season. This, our author supposes, may arise from a variety of combined causes; but the principal one, he apprehends, may proceed from that of moulting; for, although horses in general do not cast their hair at this season as they do in the spring, yet, as a considerable change takes place in its thickness and length at this period, it may properly be called their moulting season. "Horses of all colours," says Buffon, "like most animals covered with hair, moult or cast their hair every year, commonly in the spring, and sometimes in the autumn. As they are then weaker than at any other period, they require more care, and should be more plentifully fed." The diseases that prevail at this period, in horses, are noticed by Mr. Clark as follows.

"As those horses," says he, "that are kept in warm stables, and well fed through the winter, are hearty and vigorous in the spring, when the season is gradually turning milder and warmer, their moulting at this season is not attended with that faintness, &c. to which they are liable on their moulting towards the end of autumn." The reason of this he attributes to the food of horses, which in the spring is dry, producing richer and better nourishment; also to the change of the season which then takes place, and which is more agreeable to their constitutions. Towards the end of autumn, he observes, it is very different with the generality of horses, and especially with those that have been fed with new hay, new grain, or late grass, and, at the same time, have undergone severe labour. Such kind of food, abounding too much with watery juices, produces less nourishment, and causes a general laxity of the muscular fibres of the whole body; and hence arises the increased languor and weakness so generally prevalent during the time of moulting.

"It is observed," continues this writer, "that horses kept in warm stables, and well fed, moult early in the spring; those that run abroad at grass moult much later. But if the former should be exposed to cold winds or rain for any length of time together, by being turned out to pasture, or otherwise exposed to cold weather, after they have once cast their winter coat, it appears that their hair will then grow thicker and longer, the same as it does in the beginning of winter, and continue so till the season grows milder, or that they are kept in warm stables: in this case, such horses

may be said to have moulted twice in the spring."

The cold and moisture of the weather at this season, in Britain, are likewise adduced as a farther cause, contributing to increase this indisposition by occasioning a constriction of the pores of the skin; for at this period the hair of the generality of horses stares, whilst, at the same time, the skin is commonly dry and hard, or the animal is what is called hide-bound. They sweat, indeed, most profusely when put to any hard work, merely through weakness and relaxation; yet that natural insensible perspiration, which produces a shining and smooth appearance on the coat, seems to be almost suspended. Under such circumstances, they are disposed, upon any irregular management, to fall into diseases of various kinds. From the general constriction of their pores, that fluid which ought to pass off by insensible perspiration is retained; hence, the quantity of fluids in the vessels being increased whilst the muscular fibres through the whole system are relaxed, a deranged state of the circulation takes place, and hence proceed swellings of the legs, greasy heels, &c. so common at this season of the year.

On the other hand, horses that have had the early spring-grass, and are afterwards kept on hay, with a good allowance of grain, and daily accustomed to moderate exercise, suffer no material injury from moulting in the autumn, further than their being more liable to catch cold at this time, from the alternate changes they are exposed to, before their coats of hair have grown sufficiently thick to resist the cold.

Robust horses, at grass through the summer, if exposed to active exercises, are liable to many diseases about the time of moulting, as the interval from the time they are taken from grass, and the moulting, is too short to admit of their bodies being prepared to perform these exercises with safety to themselves. Hence they fall into that languor, &c. peculiar to this season; and, if left in the stable too much at rest, their gross habit of body disposes them to fever, disorders of the lungs, swelling of the legs and glands about the throat and jaws, and running sores, &c. nor are they able to undergo common exercises without being jaded.

Horses that run at grass through the summer and autumn are still in a worse situation. These are not only more liable to the foregoing diseases, from their very lax habit of body, but are less fit for active exercises of any kind, and require a longer time to be brought into a proper state. This period, in particular, proves critical with them, and, indeed, they generally fall victims to disease if too much worked.

It happens too, that in the situation above mentioned, the means required to render horses fit for active exercises, and to carry off the appearance of swelling of the legs, &c. are evacuations of every kind, such as bleeding, purging, diuretics, &c. At the same time, these methods are sometimes hurried on with a degree of haste that would even affect a sound horse, of the most hardy habit of body, at any season, and reduce him to great weakness. The moulting now approaches, which still adds to it. In these circumstances the constitution receives too great a shock to be resisted; and hence many horses fall a sacrifice to this treatment, or, if they survive, they are attacked with some chronic disorder, which renders them useless to their owners.

"The end of autumn," says Mr. Clark, "likewise proves very severe on those horses whose flesh and strength are exhausted from continued hard labour, or violent exercises, as posting, &c. through the summer and autumn: when the moulting comes on in this low, spiritless state of body, it carries off great numbers of them, that by proper care in moderating their labour, together with good nursing, and feeding them with rich boiled food at this time, their lives might be preserved. Such soft nourishing food becomes the more necessary for horses of this description at this particular period, in order to support them under the moulting, as the serous or watery parts of their fluids having been drained off by the violent perspiration they were exposed to, their muscular fibres are then too rigid, and the blood too thick for circulating so freely as it ought to do through the fine capillary vessels; hence they are disposed to fall into those disorders which proceed from this cause.

"Many of those horses that are thought to be worn out from posting, &c. at the end of autumn, when they come to be fed with boiled food, or with potatoes or carrots, and continued so through the winter, recover surprisingly. This last-mentioned food recovers their flesh; it renews their fluids in general, and promotes all the natural secretions: it operates on them nearly in the same manner as the spring-grass; it purges them gently on the first use of it, and corrects the whole habit. On changing their food to that which is hard and dry, as oats and beans, and increasing their exercise gradually towards the spring, they soon become fit for the most active exercises, without any previous preparation from medicine, &c.

"This season likewise proves destructive to aged horses: when the green food is exhausted, they are then obliged to feed on hard dry food; in some, the digestive powers may not only be weaker, but the teeth, at the same time, may be defective in not breaking down the hard food so minutely as it ought to be, in order to render it fit for digestion, and the nourishment of the body."

After illustrating this by a case in point, Mr. Clark proceeds to observe, that "As the disorders which commonly prevail at this time amongst horses proceed in a great measure from catching cold, together with the sickliness attending the moulting, horses are differently affected, according to circumstances of habit of body, and the treatment they may be exposed to; some are affected with colds in the head, attended with inflammation and swelling of the glands about the throat and jaws, which too frequently, from want of proper care, terminate in the glanders; hence this disorder is frequent at this season. Some horses are affected with coughs, and other disorders of the lungs. Rheumatism is likewise common in different parts of the body, particularly in the neck, which is called the chords. Epidemical diseases frequently originate at this period, and continue with more or less violence through the winter, and sometimes till towards the spring. Fever is likewise common, together with a variety of other complaints, which would be tedious to mention. All these disorders are forwarded from the above circumstances, together with horses breathing a heated foul air in their stables, and their bodies being exposed suddenly to the chillness of the weather, before their coats of hair have grown sufficiently thick to resist the cold, &c. for it is observed that horses which run abroad in the fields day and night moult much sooner in the season; by which means they are

sufficiently guarded against the severity of the weather when it becomes cold and damp; neither is it remarked that they are so liable to be affected with those epidemical diseases which prevail amongst horses that are kept in too warm stables. This sickly disposition amongst them continues with more or less violence till such time as the weather turns more favourable and dry, or that the frost sets in. It commonly commences, if the weather be moist, cold, and damp, about the middle of October, and continues till towards the middle of December: after which, if it be favourable, horses generally turn more lively and vigorous, and acquire their usual spirit and healthy appearance, &c."

From what has been said, it may be observed, that as horses are generally more weakly at the time of moulting towards the end of autumn than at any other season, their labour, when circumstances will admit, should be moderate. "Their feeding should be increased, in order to strengthen and support them during this period. It ought likewise to be of the very best quality, as old hay, old grain, that is, of the preceding year's growth; and if the grain that is given them was broken down in a mill, it would prove more nourishing than in any other way it could be given them. New hay, or new grain of the same year's produce, ought to be avoided, as it is extremely hurtful to horses that must undergo severe labour or active exercises, of which we have formerly taken notice. Good rubbing and frequent dressing are likewise of great benefit.

"All evacuations, such as bleeding, purging, rowels, &c. ought to be administered with caution, as such prescriptions contribute greatly to increase that natural weakness, &c. formerly mentioned, which prevails in the constitution of horses at this period. At the same time it is to be understood, that horses are not by any means to stand too much at rest in the stable. Fresh air, with moderate exercise, when the weather will permit, being absolutely necessary to promote their health; neither is the proper use of the above prescriptions to be neglected when they are thought necessary, and prescribed with judgment. All the precautions formerly mentioned, with respect to their stables, ought to be attended to, that they are kept clean, well ventilated, and yet moderately warm. Body-cloths, however necessary they may be thought for keeping their coats of hair fine, smooth, and clean in the stable, ought to be dispensed with. As horses cannot with propriety be ridden with them, they must therefore be stripped the moment they are to go abroad, even although they should happen to be in a strong perspiration at the time; by which means they are liable to catch cold, &c. And surely the health of a horse is of much more consideration to his proprietor than the looks or appearance of his coat of hair, especially when it is considered, that good rubbing and frequent dressing will produce the same effect on the appearance of the hair. At the same time that this operation will in a great measure prevent the consequences above mentioned, of rendering horses so very liable to catch cold."

A single rug Mr. Clark thinks a sufficient covering for a horse whilst in the stable; and that more clothing than this may prove hurtful.

MOULTING (Fox), is applied to birds. See ORNITHOLOGY.

MOULTON (South), a corporate town in Devonshire, with a market on Saturday. It was anciently, with North Moulton, a royal demesne, and sent members to parliament in the reign of Edward I. It is governed by a mayor, and has manufactures of serges, shaloons, and felts. It is seated on the Moul, 12 miles S.E. of Barnstaple, and 177 W. by S. of London. Lon. 3. 55 W. Lat. 51. 5 N.

To MOUNCH. *To* MAUNCH. *v. a.* To eat.

MOUND, a term used for a bank, rampart, or other fence, particularly of earth.

MOUND, or MOND, in heraldry, is a ball or globe with a cross upon it; such as our kings are usually drawn with, holding it in their left hand, as they do the sceptre in the right.

MOUNT, an elevation of earth, called also mountain.

The words mount and mountain are synonymous; but the former is scarce ever used in prose, unless when accompanied with some proper name; as Mount Ætna, Mount Gibel, Mount Lebanon, Mount Sinai, Mount Atlas, Mount Parnassus, &c.

To MOUNT. *v. n.* (*monter*, French.) 1. To rise on high (*Shakspeare*). 2. To tower; to be built up to a great elevation (*Job*). 3. To get on horseback (*Shaksp.*). 4. (for *amount.*) To attain in value (*Pope*).

To MOUNT. *v. a.* 1. To raise aloft; to lift on high (*Shaksp.*). 2. To ascend; to climb (*Dryden*). 3. To place on horseback (*Dry.*). 4. To embellish with ornaments. 5. *To* MOUNT *guard.* To do duty and watch at any particular post. 6. *To* MOUNT *a cannon.* To set a piece on its wooden frame for the more easy carriage and management in firing it.

MOUNT EDGECUMBE, a prodigious high peak, on the W. side of the entrance of Cook's Strait, in New Zealand. Its height is supposed not to be much inferior to that of the peak of Teneriff.

MOUNTMELLICK, a town of Ireland, in Queen's County. The wool-combing, malting, and tanning businesses, with the cotton manufacture, and bleaching, are carried on here. It is five miles N. of Maryborough, and 42 W.S.W. of Dublin.

MOUNTRATH, a town of Ireland, in Queen's County. Iron forges and furnaces have been long erected in its neighbourhood, but from the scarcity of charcoal have not been in regular use: the woollen manufacture forms the principal trade. It is six miles W.S.W. of Maryborough, and 23 N. of Kilkenny. Lon. 6. 54 W. Lat. 53. 2 N.

MOUNTSBAY, a bay on the south coast of Cornwall, between the Land's End and the Lizard Point. It is so named from a lofty peninsulated rock, called Mount St. Michael, which rises within it. Among the rocks, on this part of the coast, breeds the Cornish chough, or red-legged crow, noted for stealing and carrying away whatever it finds. In Mountsbay is a considerable pilchard fishery.

MOUNTSORREL, a town in Leicestershire, at the foot of a high mount or rock, of a sorrel-coloured stone, extremely hard. Of rough stones, hewn out of this rock, the buildings are

erected the sand treet is paved. It has a market on Monday, and is seated on the Stour, 20 miles S.E. by S. of Derby, and 105 from London. Lon. 1. 9 W. Lat. 52. 45 N.

MOUNTS OF PIETY, certain funds or establishments in Italy, where money is lent out on some small security. There were also mounts of piety in England, raised by contribution for the benefit of people ruined by the extortions of the Jews.

MOUNTAIN (*mons*), a considerable eminence of land, elevated above every thing adjoining to it, and commanding all the surrounding places: it is commonly full of inequalities, cavities more or less exposed, and strata half laid open.

This name is likewise given to a chain of mountains; as when we speak of Mount Atlas in Africa; Mount Caucasus, which begins above Colchis and ends at the Caspian sea; the Pyrenean mountains, which separate France from Spain; and the Apennine mountains, which run through the whole of Italy.

Those who have surveyed the earth in general, and studied nature on a grand scale, have constantly been struck with admiration and astonishment at the sight of such majestic eminences, which, extending in different ways, seem to rule over the rest of the globe, and which present to the beholder a spectacle equally magnificent and interesting. In them it has been supposed we must search for a solution of the important problem regarding the creation of the world.

Naturalists reckon several kinds of mountains; and conjecture that these elevations of the earth have not all the same origin, nor date their commencement from the same era.

1. Those mountains which form a chain, and which are covered with snow, are considered as primitive or antediluvian. They are like majestic bulwarks scattered on the surface of the globe, and greatly exceed the other mountains in height. In general, their elevation is very sudden, and their ascent very steep and difficult. Their shape is that of a pyramid crowned with sharp and prominent rocks, on which no verdure is to be seen, but which are dry, naked, and as it were stripped of their soil, which has been washed away by the rains, and which present an awful and horrible aspect, sufficient to impress the coldest imagination with terror. These primitive mountains, which astonish the eye, and where wind only reigns, are condemned by nature to perpetual sterility. At the foot of them we frequently find paths less steep and winding than when we ascend to a greater height. They every where present thundering cascades, frightful precipices, and deep valleys. The depressions and excavations correspond with the quantity of water, the motion of which is accelerated in its fall, and which sometimes produces a total sinking or an inclination of the mountain. The wrecks to be found at the foot of most peaks show how much they have suffered from the hand of time. Nothing meets the eye but enormous rocks, heaped in confusion on one another, which prevent the approach of the human race. On the summits of these mountains or high eminences, which are only a series of peaks frequently detached from one another, the prominent rocks are covered with eternal snow and ice, and surrounded with floating clouds which are dispersed into dew. In a word, the rugged cliffs oppose an inaccessible rampart to the intrepidity of man; and nature exhibits a picture of disorder and decay. No shells or other organised marine bodies are to be found in the internal part of these primitive mountains: and though search has been made, by digging, on the tops of the Alps and the Pyrenees, no substances of this nature have yet been discovered, except on the sides near the base. Nothing is to be met with but continued rocks, caverns dug by the hand of nature, and abounding in crystallizations of great beauty, with various minerals. The stone of which they consist is an immense mass of quartz, somewhat varied, which penetrates into the bowels of the earth in a direction almost perpendicular to the horizon. We find no calcareous spar but in the fissures or rents which have some extent and an evident direction; and at great depths we find new parts as it were, or, in other words, the primitive state of things. All primitive mountains furnish proofs of these assertions. Of this kind in Europe are the Pyrenees, the Alps, the Apennines, the mountains of Tyrol, the mountain of the giants in Silesia, the Carpathian mountains, the mountains of Saxony, those of Norway, &c. In Asia we find the Riphean mountains, Mount Caucasus, Mount Taurus, and Mount Libanus: in Africa, the mountains of the Moon; and in America, the Apalachian mountains, and the Andes or Cordilleras. Many of the latter have been the seats of volcanos.

2. Another kind of mountains are those which are either detached, or surrounded with groups of little hills, the soil of which is heaped up in disorder, and the crust gravelly and confusedly arranged together. These are truncated, or have a wide mouth in the shape of a funnel towards the summit, and which are composed of, or surrounded with, heaps of calcined and half vitrified bodies, lava, &c. This class of mountains appear to have been formed by different strata raised up and discharged into the air, upon occasion of the eruption of some subterraneous fire. The isles of Santorin, Monte-Nuovo, Mount Etna, Adam's Peak in the island of Ceylon, the Peak of Teneriffe in the Canary Islands, and many others, have been formed in this manner. When very high mountains of this kind are covered with sea-shells, we may consider their summits as having once constituted a part of the bottom of the ocean. A number of these mountains have been formed in the memory of man; and present nothing to the view but disordered ruins, confused masses, parts heaped together in the greatest irregularity, and productions formed by eruptions or by the falling in of the earth. When a mountain of this kind is connected with the land, and advances farther into the sea than the adjoining country, it is then termed a Cape, Head, or Promontory; such as the Cape of Good Hope at the southern extremity of Africa. Mountains of the second rank are commonly more easy of access. Dr. Haller observes, that the angle formed between their base and their declivity is larger; that they have fewer springs; and that their plants are different from those of the Alps. The peasants in Swisserland, he tells us, are acquainted with the difference betwixt these two kinds of mountains.

3. Those mountains, whether arranged in a group or not, the earth or stone of which is disposed in strata more or less regular, and consisting of one or more colours and substances, are supposed to be produced by the substances deposited slowly and gradually by the waters, or by soil gained at the time of great floods. We daily see little hills formed in this manner, which are always of a small height compared with those of the first

order, and round in the top, or covered with soil frequently forming a pretty flat and extensive surface. We there find likewise sand and heaps of round pebbles, like such as have been worn by the waters. The internal part of these mountains consists of a heap of strata almost horizontal, and containing a prodigious quantity of shells, marine bodies, and fish-bones. Although these mountains formed by strata sometimes degenerate into little hills, and even become almost flat, they always consist of an immense collection of fossils of different kinds, in great preservation, and which are pretty easily detached from their earthy bed whether harder or softer. These fossils, consisting of marine shells intermixed and confounded with heaps of organized bodies of another species, present a picture of astonishing disorder, and give indubitable indications that some extraordinary and violent current has confounded and accumulated in the greatest disorder and precipitation foreign substances and shells of various kinds. These, removed from their natural and original place, by their union form an elevation and a mountain, which are in fact nothing but a composition of the wrecks of bodies formerly organized. All these phenomena seem to prove, that most of these mountains chiefly owe their origin to the sea, which once covered some parts of our continent, now left dry by its retreat. (According to the principles of this system, Anaxarchus explained the formation of the mountains of Lampsacus.) In these mountains we likewise find wood, prints of plants, strata of clay, marl, and chalk, different beds of stone succeeding one another, such as slate, marble which is often full of sea-shells, lime-stone which appears to be wholly formed from the wreck of shells, plaster-stone, entire strata of ochre, and beds of bitumen, mineral salt, and alum.

The strata of mountains which are lower and of a recent date, or formed by recent accidents, sometimes appear to rest upon, or to take their rise from, the sides of primitive mountains which they surround, and of which they in some measure form the first steps in the ascent; and they end by being insensibly lost in the plains. With respect to the irregularity of some strata in recent mountains, it is owing to violent and sudden inundations, to torrents, and to local revolutions which have produced angles, leaps, and sinkings down of the strata. See GEOLOGY.

A very ingenious writer, Dr. Kirwan, has lately published an interesting essay on the declivities of mountains, from which we present our readers with the following observations:

Among the various causes to whose activity the planet we inhabit owes its present wonderfully diversified appearance, some undoubtedly exerted their influence from its very origin, and others at subsequent periods; of these last one at least, namely, the Noachian deluge, was universal in its operation, while the effects of many more were partial and local, such as those resulting from earthquakes, volcanos, particular inundations, &c.

In a general survey of the globe, it is only to general causes, whose operation was universal, that our attention can be directed; the effects of partial causes being the proper objects of the geological history of those countries that were particularly affected by them.

But to distinguish causes of the former class from those whose operation was more confined, it is necessary to discover some character by which their effects may unequivocally be discerned.

Now a general uniformity, or agreement in some particular circumstance in every part of the globe, seems to be a sure test of the operation of some general cause. The discovery of uniform appearances is therefore of primary importance in geological researches. In the present essay Mr. K. confines himself to the investigation of one instance of this sort, namely, the inequality of declivity which the sides or flanks of mountains exhibit in every part of the globe hitherto examined according to the points of the compass to which they face, and are exposed.

That one part of almost every high mountain or hill is steeper than another, could not have escaped the notice of any person who had traversed such mountains; but that nature in the formation of such declivities had any regard to different aspects or points of the compass, seems to have been first remarked by the celebrated Swedish geologist Mr. Tilas, in the 22d vol. of the Memoirs of Stockholm for 1760. Neither Varenius, Lulolph, nor Buffon in his Natural History published in 1748, have noticed this remarkable circumstance.

The observation of Tilas however relates only to the extreme ends, and not to the flanks of mountains; with respect to the former, he remarked that the steepest declivity always faces that part of the country where the land lies lowest, and the gentlest that part of the country where the land lies highest, and that in the southern and eastern parts of Sweden they consequently face the E. and S.E. and in the northern the W. The essential part of this observation extends therefore only to the general elevation or depression of the country, and not to the bearings of these declivities.

The discovery that the different declivities of the flanks of mountains bear an invariable relation to their different aspects, seems to have been first published by Mr. Bergman in his physical description of the earth, of which the second edition appeared in 1773. He there remarked, that in mountains that extend from N. to S. the western flank is the steepest, and the eastern the gentlest. And that in mountains which run E. and W. the southern declivity is the steepest and the northern the gentlest, vol. 2d. § 187.

This assertion he grounds on the observations related in his first vol. § 32, namely, that 1° in Scandinavia the Suevoberg mountains that run N. and S. separating Sweden from Norway, the western or Norwegian sides are the steepest, and the eastern or Swedish the most moderate, the verticality or steepness of the former being to that of the latter as 40 or 50 to 4 or 2.

2dly. That the Alps are steeper on their western and southern sides than on the eastern and northern.

3dly. That in America the Cordelieres are steeper on the western side, which faces the Pacific Ocean, than on the eastern. But he does not notice a few exceptions to this rule in particular cases which will hereafter be mentioned.

Buffon, in the first vol. of his Epochs of Nature published in 1778, p. 185, is the next who notices the general prevalence of this phenomenon, as far as relates to the eastern and western sides of the mountains that extend from north to south, but he is silent with respect to the north and south sides of the mountains that run from east to west; nay, he does not seem to have had a just comprehension of this phenomenon, for he considers it conjointly with the general dip of the regions in which these mountains exist. Thus he tells us, vol. 1st, p. 185, that in all continents the general declivity, taking

it from the summit of mountains, is always more rapid on the western than on the eastern side; thus the summit of the chain of the Cordelieres is much nearer to the western shores than to the eastern; the chain which divides the whole length of Africa, from the Cape of Good Hope to the mountains of the Moon, is nearer, he says, to the western than to the eastern seas; of this however he must have been ignorant, as that tract of country is still unknown.

The mountains which run from Cape Comorin through the peninsula of India are, he says, much nearer to the sea on the east than on the west; he probably meant the contrary, as the fact is evidently so, and so he states it in the 2d vol. p. 295; the same he tells us may be observed in islands and peninsulas, and in mountains.

This remarkable circumstance of mountains was notwithstanding so little noticed, that in 1792 the author of an excellent account of the territory of Carlsbad in Bohemia tells us he had made an observation, which he had never met with in any physical description of the earth, namely, that the southern declivity of all mountains was much steeper than the northern, which he proves by instancing the Erzgebirge of Saxony, the Pyrenees, the mountains of Switzerland, Savoy, Carinthia, Tyrole, Moravia, the Carpathian and Mount Hæmus in Turkey, 2, Bergm. Jour. 1792, p. 385, in the note.

Herman in his Geology, published in 1787, p. 90, has at least partially mentioned this circumstance, for he says that the eastern declivities of all mountains are much gentler and more thickly covered with secondary strata, and to a greater height, than the western flanks, which he instances in the Swedish and Norwegian mountains, the Alps, the Caucasian, the Appenine and Ouralian mountains; but the declivities bearing a southern or northern aspect he does not mention.

La Metheric, in the 4th vol. of his Theory of the Earth, of which the second edition appeared in 1797, a work which abounds in excellent observations, p. 381; produces numerous instances of the inequality of the eastern and western declivities, but scarce any of the northern and southern, whose difference he does not seem to have noticed, but he makes a remark which we have not seen elsewhere, that the coasts of different countries present similar declivities.

With regard to eastern and western aspects, he thinks that a different law has obtained in Africa from that which has been observed in other countries, for in that vast peninsula he imagines the eastern declivities of mountains are the steepest, and the western the gentlest. Of this however he adduces no other proof, than that the greatest rivers are found on the western side: this proof seems insufficient, as, if mountains be situated far inland, great rivers may flow indiscriminately from any side of them, and sometimes few rivers flow even from the side whose descent is most moderate, for instance, from the eastern side of the mountains of Syria; the Elbe and the Oder, two of the greatest rivers in Germany, take their course from the western sides, the first of the Bohemian and the other of the Moravian mountains, which yet are the steepest. Many originate from lakes, as the Shannon with us; many take such a winding course, that from a bare knowledge of the place of their disemboguement it is impossible to judge from what side of a mountain they issue, if from any; their course at most discovers the depression of the genera level of the country.

In 1798, the celebrated traveller and circumnavigator, John Reinhold Foster, published a geological tract which merits so much more attention, as all the facts were either observed by himself, or related to him by the immediate observers. In this he states as a fact universally observed, that the south and south-east sides of almost every mountain are ste p, but that the north and north-west sides are gently covered and connected with secondary strata in which organic remains abound, which he illustrates by various instances, some of which have been already, and others will presently be mentioned.

At present this fact attracts the greatest attention, being obviously connected with the original structure of the globe, and clearly proving that mountains are not mere fortuitous eruptions unconnected with transactions on the surface of the earth, as has of late been confidently advanced.

We shall now state the principal observations relative to this object, that have been made in different parts of the world.

In Europe.

1. The mountains that separate Sweden from Norway extend from north to south, their western sides are steep and the eastern gentle, 1. Bergm. Erde Beschreib. p. 157.

2. The Carpathian mountains run from E. to W. their southern sides towards Hungary are steep, their northern towards Poland moderate, Foster, § 46.

3. Dr. Walker, professor of natural history at Edinburgh, observed that the coasts and hills of Scotland are steeper and higher on the western side than on the eastern; Jamison's Mineralogy of Shetland, p. 3. However, Jamison observed, that the south side of the isle of Arran is the lowest, and the north side the highest, p. 51.

4. The mountains of Wales are gentle on the eastern and steep on the western sides.

5. The mountains of Partheiy, in the county of Mayo, are steep on the western side.

6. The mountains which separate Saxony from Bohemia descend gently on the Saxon or northern side, but are steep on the Bohemian or southern side; Charpent, p. 75. The southern declivity is to the northern as six to two, 2d Bergm. Journ. 1792, p. 384 and 385.

7. The mountains which separate Silesia from Bohemia run nearly from E. to W. yet are steeper on the northern or Silesian side than on the opposite Bohemian; Assemanni Silesia, 335. Such branches as run from N.E. to S.W. have their western covered with primordial strata, and consequently less steep; 4. New Roz. p. 157.

8. The Meissener in Hessia is steeper on the N. and E. sides which face the Warra, than on the south and western; 1. Bergm. Journ. 1789, p. 272.

9. The mountains of the Hartz and Habichtswald are steep on the south and gentle on the northern sides, Foster, § 46.

10. The Pyrenees, which run from E. to W. are steeper on the southern or Spanish side; Carbonieres, XIII.

11. The mountains of Crim Tartary are gentle on the northern and steep on the southern sides, Foster, ibid.

In Asia.

12. The Ourals, which stretch from N. to S. are far steeper on the western than on the southern sides; Herman Geologie, p. 90, and 2d Ural Beschreib. p. 389.

13. The mountain of Armenic to the west of the Ourals is steep on its E. and N. sides, but gentle on the southern and western; 1. Pallas Voy. p. 277.

14. The Altaischan mountains are steep on their southern and western sides, but gentle on the northern and eastern; Foster, ibid. and Herman 2d. Ural Beschreib. p. 390, in the note.

15. So also are the mountains of Caucasus, 3d. Schrift. Berl. Geselsch. 471.

16. The mountains of Kamskatska are steep on the eastern sides, Pallas, 1 Act. Petropol. 1777, p. 43.

17. The Ghauts in the Indian peninsula are steep on the western sides.

18. The mountains of Syria which run from N. to S. skirting the Mediterranean, are said to be steeper on the western side facing the Mediterranean; 4. La Metherie, p. 380.

In America.

The Cordelieres run from N. to S. their western flanks towards the Pacific are steep, their eastern descend gradually.

In Guiana there is a chain of mountains that run from E. to W. their southern flanks are steep, their northern gentle; Voyages de Condamine, p. 140.

To assign the causes of this almost universal allotment of unequal declivities to opposite points, and why the greatest are directed to the west and south, and the gentlest on the contrary to the east and north, it is necessary to consider,

1. That all mountains were formed while covered with water.

2. That the earth was universally covered with water at two different æras, that of the creation, and that of the Noachian deluge.

3. That in the first æra we must distinguish two different periods, that which preceded the appearance of dry land, and that which succeeded the creation of fish, but before the sea had been reduced nearly to its presect level; during the former, the primæval mountains were formed, and during the last, most of the secondary mountains and strata were formed.

4. That all mountains extend either from E. to W. or from N. to S. or in some intermediate direction between these cardinal points, which need not be particularly mentioned here, as the same species of reasoning must be applied to them as to those to whose aspect they approach most.

These preliminary circumstances being noticed, we are next to observe that during the first æra, this vast mass of water moved in two general directions, at right angles with each other, the one from E. to W. which needs not to be proved, being the course of tides which still continue, but were in that ocean necessarily stronger and higher than at present: the other from N. to S. the water tending to those vast abysses then formed in the vicinity of the south pole, as shewn in my former essays. Before either motion could be propagated, a considerable time must have elapsed.

Now the primæval mountains formed at the commencement of the first æra, and before this double direction of the waters took place, must have opposed a considerable obstacle to the motion of that fluid in the sense that crossed that of the direction of these mountains. Thus the mountains that stretch from N. to S. must have opposed the motion of the waters from E. to W. this opposition diminishing the motion of that fluid disposed it to suffer the earthy particles with which in those early periods it must have been impregnated, to crystallize or be deposited on these eastern flanks, and particularly on those of the highest mountains, for over the lower it could easily pass; these depositions being incessantly repeated at heights gradually diminishing as the level of the waters gradually lowered, must have rendered the eastern declivities or descent gentle, gradual, and moderate, while the western sides receiving no such accessions from depositions, must have remained steep and craggy.

Again, the primæval mountains that run from E. to W. by opposing a similar resistance to the course of the waters from N. to S. must have occasioned similar depositions on the northern sides of these mountains against which these waters impinged, and thus smoothed them.

Where mountains intersect each other in an oblique direction, the N. E. side of one range being contiguous to the S. W. flanks of another range, there the afflux of adventitious particles on the north-east side of the one must have frequently extended to the S. W. side of the other, particularly if that afflux were strong and copious; thus the Erzgebirge of Saxony, which run from W. to E. have their N. E. sides contiguous to the S. W. side of the Riesengebirge that separate Silesia from Bohemia, and hence these latter are covered with the same beds of gneiss, &c. as the northern sides of the Saxon, and thereby are rendered smooth and gentle comparatively to the opposite side, which being sheltered, remains steep and abrupt, which explains the seventh observation.

The causes here assigned explain why the covering of adventitious strata on the highest mountains is generally thinnest at the greatest height, and thickest towards the foot of the mountain; for the bulk of the water that contained the adventitious particles being proportioned to its depth, and the mass of earthy particles with which it was charged being proportioned to the bulk of water that contained them, it is plain, that as the height of water gradually decreased, the depositions from it on the higher parts of the mountains must have been less copious than on the lower, where they must have been oftener repeated.

Hence, 2. granitic mountains, generally the most ancient, frequently have their northern or eastern sides covered with strata of gneiss or micaceous shistus, and this often with argillite, or primæval sand-stone, or lime-stone, these being either of somewhat later formation or longer suspendible in water.

Hence, 3. different species of stone are often found at different heights of the same flank of a mountain, according as the water which conveyed these species happened to be differently impregnated at different heights; during its first æra its depositions formed the primitive stony masses, but after the creation of fish, lime-stone, sand-stone, farcilites, and secondary argillites, in which piscine remains are found, were deposited. But during the second æra, viz. that of the Noachian deluge, by reason of the violence and irregularity of its aggression, the depositions were more miscellaneous and are found at the greatest heights; yet in general they may well be distinguished by the remains of land animals, or of vegetables, or of both, which they present in their strata (or at least by the impressions of vegetables which they bear) as these must have been conveyed after the earth had been inhabited. But mountains regularly stratified bearing such remains, for instance the carboniferous, cannot be deemed to have been formed in a period so tumultuous. During this deluge the waters also held a

different course, proceeding at first from south to north, and afterwards in both opposite directions.

Hence, and from various contingent local causes, as partial inundations, earthquakes, volcanos, the erosion of rivers, the elapsion of strata, disintigration, the disruption of the lofty mounds by which many lakes were anciently hemmed in, several changes were produced in particular countries that may at first sight appear, though in reality they are not, exceptions to the operations of the general causes already stated.

Thus the mountains of Kamskatska had their eastern flanks torn and rendered abrupt by the irruption of the general deluge, probably accompanied by earthquakes. And thus the Meissener had its E. and N. flanks undermined by the river Warra, as Werner has shewn; thus the eighth and sixteenth observations are accounted for, as is the thirteenth, by the vast inundations so frequent in this country, 1 Pallas, p. 172, which undermined or corroded its E. side, while the western were smoothed by the calcareous depositions from the numerous rivers in its vicinity.

Hence, 4. we see why on different sides of lofty mountains different species of stones are found, as Pallas and Saussure have observed, 2 Sauss. § 981, a circumstance which Saussure imagined almost inexplicable, but which Dolomieu has since happily explained, by shewing that the current which conveyed the calcareous substances to the northern, eastern, and north-eastern sides of the Alps, for instance, was stopped by the height of these mountains, and thus prevented from conveying them to [illegible] southern sides, and thus the north-eastern sides [illegible] rendered more gentle than the opposite, 3. Rotz. p. 425, conformably to the theory here [illegible]

Hence, 5. where several lofty ridges run parallel [illegible] each other, it must frequently happen that the external should intercept the depositions that do not surmount them, and thus leave the internal ridges steep on both sides.

Hence, 6. low granitic or other primitive hills are frequently uncovered by adventitious strata on all sides, as at Phanet in the county of Donegal, or are covered on all sides; the impregnated waters either easily passing over them, or stagnating upon them, according to the greater or less rapidity of its course, and the obstacles it met with.

The twofold motion of the ancient ocean is noticed both by Buffon and Bergman, but neither of them have deduced from it the true explanation of the phenomena of which we here treat: Buffon attributes the formation of secondary mountains to deposition of sediments from the sea after the existence of fish, 1. Epoques, p. 143, in 8vo. which he says invested the bases of mountains without noticing any distinction of sides, p. 144 and 170. He thinks these sediments were equally conveyed from both poles towards the equator, for it is the equatorial regions that he thinks those mighty caverns opened, towards which the primitive ocean was impetuously borne and in which it was ingulphed, p. 181, 182, and 183. If so, similar declivities should be formed on the southern as on the northern sides of mountains, which is contrary to the observed facts. His explanation of the eastern and western declivities is defective and erroneous, for he attributes the abruptness of the western sides to the erosion of the coasts on that side (an erosion that exists only in fancy) and the smoothness of the eastern to the gradual desertion and retreat of the sea on that side, p. 184 and 185, a retreat equally fictitious, as De Luc has well shewn. Whereas since the general motion of the sea is from E. to W. if the erosion were of either side it should rather be on the eastern than on the western; besides, if the gentle declivities of the eastern sides of mountains arose from the gradual retreat of the sea, the petrifactions of the secondary mountains thus formed should consist of such shell-fish as inhabit shallow seas or shores, whereas they consist chiefly of those called pelagicæ, which inhabit the greatest depths.

With respect to the eastern and western declivities, Mr. Bergman's account of the origin of their inequality agrees exactly with mine, 2. Bergm. Erdeklotet § 183 and 187, but he fails in accounting for the inequality of the northern and southern, for he supposes the course of the water to tend equally from both poles towards the æquator, which would render the depositions equal on both sides, which is contrary to observation.

Mountains (Height of). See Barometer.

Mountains (White). See New Hampshire.

Mountains of the Moon, a chain of mountains in Africa, extending themselves between Abyssinia and Monomotapa, and receiving the above denomination from their great height.

Mountains of the Lions, also in Africa, divide Nigritia from Guinea, and extend as far as Ethiopia. They were styled by the ancients the mountains of God, on account of their being greatly subject to thunder and lightning.

Mountain of Forty-days, a mountain of Judea, situated in the plain of Jericho to the north of that city. According to the Abbe Mariti's description, the summit of it is covered neither with shrubs, turf, nor earth; it consists almost entirely of a solid mass of white marble, the surface of which is become yellow by the injuries of the air.

Mo'untain. *a.* (*montanus*, Latin.) Found on the mountains; pertaining to the mountains; growing on the mountains (*Shakspeare*).

Mountain-ash, in botany. See Sorbus.

Mountain-blue, in mineralogy. See Cuprum.

Mountain-butter. See Alumen.

Mountain-cork, in mineralogy. See Asbestos.

Mountain-flax, in mineralogy. See Asbestos.

Mountain-green, in mineralogy. See Cuprum.

Mountain-leather, in mineralogy. See Asbestos.

Mountain-wood, in mineralogy. See Asbestos.

MOUNTAINE'ER. *s.* (from *mountain*.) 1. An inhabitant of the mountains (*Bentley*). 2. A savage; a freebooter; a rustic (*Milton*).

MO'UNTAINET. *s.* (from *mountain*.) A hillock; a small mount (*Sidney*).

MO'UNTAINOUS. *a.* (from *mountain*.) 1. Hilly; full of mountains (*Burnet*). 2. Large as mountains; huge (*Prior*). 3. Inhabiting mountains (*Bacon*).

MO'UNTAINOUSNESS. *s.* State of being full of mountains (*Brerewood*).

MO'UNTANT. *a.* (*montant*, Fr.) Rising on high (*Shakspeare*).

MO'UNTEBANK. *s.* (*montare in banco*, Italian.) 1. A doctor that mounts a bench in the market, and boasts his infallible remedies and cures (*Hudibras*). 2. Any boastful and false pretender (*Shaks.*).

To MO'UNTEBANK. *v. a.* (from the noun.) To cheat by false boasts or pretences (*Shakspeare*).

MO'UNTENANCE. *s.* Amount of a thing in space: obsolete (*Spenser*).

MO'UNTER. *s.* (from *mount.*) One that mounts (*Drayton*).

MO'UNTY. *s.* (*montée*, French.) The rise of a hawk (*Sidney*).

To MOURN. *v. n.* (mupnan, Saxon.) 1. To grieve; to be sorrowful (*Bacon*). 2. To wear the habit of sorrow (*Pope*). 3. To preserve appearance of grief (*Samuel*).

To MOURN. *v. a.* 1. To grieve for; to lament (*Addison*). 2. To utter in a sorrowful manner (*Milton*).

MOURNE. *s.* (*morne*, Fr.) The round end of a staff; the part of a lance to which the steel part is fixed (*Sidney*).

MO'URNER. *s.* (from *mourn.*) 1. One that mourns; one that grieves (*Shaksp.*). 2. One who follows a funeral in black (*Dryden*). 3. Something used at funerals (*Dryden*).

MO'URNFUL. *a.* (*mourn* and *full.*) 1. Having the appearance of sorrow (*Dryden*). 2. Causing sorrow (*Shakspeare*). 3. Sorrowful; feeling sorrow (*Prior*). 4. Betokening sorrow: expressive of grief (*Shakspeare*).

MO'URNFULLY. *ad.* Sorrowfully; with sorrow (*Shakspeare*).

MO'URNFULNESS. *s.* (from *mournful.*) 1. Sorrow; grief. 2. Show of grief; appearance of sorrow.

MO'URNING. *s.* (from *mourn.*) 1. Lamentation; sorrow (*Esdras*). 2. The dress of sorrow (*Dryden*).

MOURNING, a particular dress or habit worn to signify grief on some melancholy occasion, particularly the death of friends or of great public characters. The modes of mourning are various in different countries; as also are the colours that obtain for that end. In Europe, the ordinary colour for mourning is black; in China, it is white; in Turkey, blue or violet; in Egypt, yellow; in Ethiopia, brown. White obtained formerly in Castile on the death of their princes. Herrera observes, that the last time it was used was in 1498, at the death of prince John. Each people pretend to have their reasons for the particular colour of their mourning: white is supposed to denote purity; yellow, that death is the end of human hopes, in regard that leaves when they fall, and flowers when they fade, become yellow; brown denotes the earth, whither the dead return; black, the privation of life, as being the privation of light; blue expresses the happiness which it is hoped the deceased does enjoy; and purple or violet, sorrow on the one side, and hope on the other, as being a mixture of black and blue.

MOURNING, among the ancients, was expressed various ways. Amongst the Jews, on the death of their relations or intimate friends, grief or mourning was signified by weeping, tearing their clothes, smiting their breasts, or tearing them with their nails, pulling or cutting off their hair and beards, walking softly, i. e. bare-foot, lying upon the ground, fasting, or eating upon the ground. They kept themselves close shut up in their houses, covered their faces, and abstained from all work, even reading the law, and saying their usual prayers. They neither dressed themselves, nor made their beds, nor shaved themselves, nor cut their nails, nor went into the bath, nor saluted any body: so that sulkiness seems to have been an indication of sorrow; and dirtiness, of distress. The time of mourning among the Jews was generally seven days: though this was lengthened or shortened according to circumstances; but thirty days were thought sufficient upon the severest occasions. The different periods of the time of mourning required different degrees of grief, and different tokens of it.

The Greeks, on the death of friends, showed their sorrow by secluding themselves from all gaiety, entertainments, games, public solemnities, the enjoyment of wine, and the delights of music. They sat in gloomy and solitary places, stripped themselves of all external ornaments, put on a coarse black stuff by way of mourning, tore their hair, shaved their heads, rolled themselves in the dust and mire, sprinkled ashes on their heads, smote their breasts with their palms, tore their faces, and frequently cried out with a lamentable voice and drawling tone, reiterating the interjection, ε, ε, ε, ε; hence funeral lamentations were called Ελεγοι. If they appeared in public during the time of mourning, they had a veil thrown over their faces and heads. During the funeral procession, certain persons called εξαρχοι θρηνων marched before, and sung melancholy strains called ολοφυρμοι; ιαλεμοι, αινοι and αιλινοι. These vocal mourners sung thrice during the procession round the pile and round the grave. Flutes were also used to heighten the solemnity. At the funerals of soldiers, their fellow-soldiers who attended, as a testimony of their affliction, held their shields, their spears, and the rest of their armour, inverted.

As to the tokens of private grief among the Romans, they were the same as those already observed as customary amongst the Greeks. Black or dark-brown were the colours of the mourning habits worn by the men; they were also common to the women. The mourning of the emperors at first was black. In the time of Augustus, the women wore white veils, and the rest of their dress black. From the time of Domitian they wore nothing but white habits, without any ornaments of gold, jewels, or pearls. The men let their hair and beards grow, and wore no wreaths of flowers

on their heads while the days of mourning continued. The longest time of mourning was ten months: this was Numa's establishment, and took in his whole year. For a widow to marry during this time was infamous. Mourning was not used for children who died under three years of age. From this age to ten they mourned as many months as the child was years old. A remarkable victory, or other happy event, occasioned the shortening of the time of mourning: the birth of a child, or the attainment of any remarkable honour in the family, certain feasts in honour of the gods, or the consecration of a temple, had the same effect. After the battle at Cannæ, the commonwealth decreed that mourning should not be worn for more than thirty days, that the loss might be forgot as soon as possible. When public magistrates died, or persons of great note, also when any remarkable calamity happened, all public meetings were intermitted, all places of concourse were shut up, and the whole city put on a face of sorrow. This also was the custom of Athens, and was even observed upon the death of Socrates, not long after he had been sentenced to death by their judges.

MO'URNINGLY. *ad.* (from *mourning.*) With the appearance of sorrowing (*Shaksp.*).

MOURZOUK, a city of Africa, and capital of the kingdom of Fezzan, situated on the banks of a small river, and well supplied with water by a multitude of wells and springs. It is surrounded by a high wall, which not only furnishes the means of defence, but affords to the government an opportunity of collecting, at its three gates, a tax on all goods (though provisions are exempted) that are brought for the supply of its people. Being formerly built with stone, it still retains the appellation of a Christian town, and the medley which it presents to the eye, of the vast ruins of ancient buildings, and of the humble cottages of earth and sand, that form the dwellings of its present Arab inhabitants, is singularly grotesque and strange: 262 miles S. Mesurata, and 940 N.E. Tombucto. Lon. 15. 5 E. Lat. 27. 20 N.

MOUSE. plural *mice. s.* (mur, Sax.) The smallest of all beasts; a little animal haunting houses and corn-fields (*Derham*).

To MOUSE. *v. n.* (from the noun.) To catch mice (*Shakspeare*).

MOUSE, in mastiology. See MUS.

MOUSE-EAR, in botany. See HIERACHIUM.

MOUSE-TAIL. See MYOSURUS.

MOUSE (Dor). See MYOXUS.

MOUSE (Shrew). See SOREX.

MO'USEHUNT. *s.* (*mouse* and *hunt.*) Mouser; one that hunts mice (*Shakspeare*).

MO'USE-HOLE. *s.* (*mouse* and *hole.*) Small hole (*Stillingfleet*).

MO'USER. *s.* (from *mouse.*) One that catches mice (*Swift*).

MO'USE TRAP. *s.* (*mouse* and *trap.*) A snare or gin in which mice are taken (*Hale*).

MOUSTACHE, in mastiology. See SIMIA.

MOUSUL, or MOSUL, a town of Asiatic Turkey, in the province of Diarbekir, situated in a plain, on the west bank of the Tigris, surrounded with walls and ditches, and defended with a castle. Almost all the houses are built of stone; the Tigris is deep and rapid, and is crossed by a bridge of boats. The air is healthy in spring, hot in summer, feverish in autumn, and inconveniently cold in winter. The inhabitants consist of Arabians, Turks, Persians, and Curds, all which languages are spoken. The Mahometans pay great respect to the tomb of one Dscherdschis, or George, whom they call a prophet. The Nestorian patriarch of Syria resides at Elkasch, near the town, where also are found many Christians, Arminians, Greeks, and Maronites. This city is not so flourishing as it has been; however, the inhabitants carry on considerable manufactures of cotton. Merchandize from India is brought hither by the way of Bassora, and European goods by the way of Aleppo: 240 miles E. Aleppo, and 480 W.N.W. Ispahan. Lon. 41. 15 E. Lat. 35. 40 N.

MOUTH. *s.* (muð, Sax.) 1. The aperture in the head of any animal at which the food is received (*Locke*). 2. The opening; that at which any thing enters; the entrance (*Arbuth.*). 3. The instrument of speaking (*L'Estrange*). 4. A speaker; a rhetorician; the principal orator (*Addison*). 5. Cry; voice (*Dryden*). 6. Distortion of the mouth; wry face (*Add.*). 7. *Down in the* MOUTH. Dejected; clouded in the countenance (*L'Estrange*).

MOUTH. (*os.*) In anatomy. The cavity of the mouth is well known. The parts which constitute it are the common integuments, the lips, the muscles of the upper and under jaw, the palate, two alveolar arches, the gums, the tongue, the cheeks, and salival glands. The bones of the mouth are the two superior maxillary, two palatine, the lower jaw, and thirty-two teeth. The arteries of the external parts of the mouth are branches of the infra-orbital, inferior alveolar, and facial arteries. The veins empty themselves into the external jugulars. The nerves are branches from the fifth and seventh pair. The use of the mouth is for mastication, speech, respiration, deglutition, suction, and taste.

Derham observes, that the mouth in the several species of animals is nicely adapted to the uses of such a part, and well sized and shaped for the formation of speech, the gathering and receiving of food, the catching of prey, &c. In some creatures it is wide and large, in others little and narrow; in some it is formed with a deep incisure into the head, for the better catching and holding of prey, and more easy communication of hard, large, and troublesome food; and in others with a shorter incisure, for the gathering and holding of herbaceous food. In birds it is neatly shaped for piercing the air; hard and horny, to supply the want of teeth; hooked in the rapacious kind, to catch and hold their prey; long and slender in those that have their food to grope for in moorish places; and broad and long in those that search for it in the mud. Nor is the mouth less remarkable in insects: in some it is forcipated, to catch, hold, and tear the prey; in

others aculeated, to pierce and wound animals and suck their blood; in others, strongly rigid, with jaws and teeth, to gnaw and scrape out their food, carry burdens, perforate the earth, nay the hardest wood, and even stones themselves, for houses and nests for their young.

MOUTH, in botany, the opening of the tube in the corol.

MOUTH, in the manage. The external parts of the mouth are the lips, the beard, the end of the nose, being a continuation of the upper lip, and the chin. The internal parts are the bars, the tongue, the channel, the palate, and the teeth.

The mouth of a horse should be moderate in size; for when too wide, we find much difficulty to bit a horse, so as that he may not swallow it, as the term is: and, if he have a little mouth, it will be difficult to get the mouth of the bit rightly fixed in it.

To have a good mouth, a horse should have a well-raised neck; and if it be somewhat large and thick, it ought to be at least well turned. But if his jaw-bones be too close, and he have also a short and thick neck, so that he cannot place his head right, his having a good mouth will avail but little.

The compliance and obedience of a horse is owing, partly, to the tender or quick sense of his mouth, which makes him afraid of being hurt by the bit; and partly by his natural disposition and inclination to obey. The mouth is called sensible, fine, tender, light, &c. Some horses have so fine a mouth, that they stop if the horseman does but bend his body behind, and raise his hand, without staying for the pull or check of the bridle.

1. A mouth is said to be fixed and certain, when a horse does not chack or beat upon the hand.

2. A false mouth, is a mouth that is not at all sensible, though the parts look well, and are all well formed.

3. A mouth of a full appui, or rest upon the hand, is one that has not the tender nice sense of some fine mouths, but nevertheless has a fixed and certain rest, and suffers a hand that is a little hard, without chacking or beating upon the hand, without bearing down or resisting the bit, insomuch that he will bear a jerk of the bridle without being much moved.

For the army, provide a horse with a mouth that bears a full rest upon the hand; for, if you take one of a tender mouth, and another horse run against him in a fight, he will be apt to rise upon his hind-feet, which a horse of a harder mouth would not do.

4. A mouth that bears more than a full rest upon the hand, implies a horse that does not obey but with great difficulty. You will readily stop such a horse, for his mouth is above a full appui upon the hand.

To MOUTH. *v. n.* (from the noun.) To speak big; to speak in a strong and loud voice; to vociferate (*Addison*).

To MOUTH. *v. a.* 1. To utter with a voice affectedly big (*Shakspeare*). 2. To chew; to eat (*Shakspeare*). 3. To seize in the mouth (*Dryden*). 4. To form by the mouth (*Brown*).

MO'UTHED. *a.* (from *mouth.*) Furnished with a mouth (*Pope*).

MO'UTH-FRIEND *s.* (*mouth* and *friend.*) One who professes friendship without intending it (*Shakspeare*).

MO'UTHFUL. *s.* (*mouth* and *full.*) 1. What the mouth contains at once. 2. Any proverbially small quantity (*L'Estrange*).

MO'UTH-HONOUR. *s.* (*mouth* and *honour.*) Civility outwardly expressed without sincerity (*Shakspeare*).

MO'UTHLESS. *a.* (from *mouth.*) Being without a mouth.

MOUTH-PIECE. A little silver or brass appendage inserted at the end of the tube of a French-horn, or trumpet, to receive the pressure of the lips in performance.

MOW. *s.* (mope, Saxon, a heap.) A loft or chamber where hay or corn is laid up (*Tusser*).

To MOW. *v. n.* (from the noun.) To put in a mow.

To MOW. *v. a.* preter. *mowed*, part. *mown.* (mapan, Saxon.) 1. To cut with a scythe (*Spenser*). 2. To cut down with speed and violence (*Shakspeare*).

To MOW. *v. n.* To gather the harvest (*Waller*).

MOW. *s.* (*moue*, French.) Wry mouth; distorted face (*Shakspeare*).

To MOW. *v. n.* (from the noun.) To make mouths; to distort the face (*Ascham*).

To MO'WBURN. *v. n.* (*mow* and *burn.*) To ferment and heat in the mow for want of being dry (*Mortimer*).

MOWEE, one of the Sandwich islands discovered by Captain Cook, is 162 miles in circumference. A low isthmus divides it into two circular peninsulas, of which the eastern is double the size of the western. The mountains in both rise to an exceeding great height, and may be seen at the distance of more than 30 leagues. The northern shores, like those of Owyhee, afford no soundings, and the country presents the same appearance of verdure and fertility. Near the west point of the smaller peninsula is a spacious bay, with a sandy beach shaded with cocoa-nut trees. The country behind has a most romantic appearance, the hills rising almost perpendicularly in a great variety of peaked forms; and their steep sides and deep chasms between them are covered with trees. The tops of these hills are entirely bare, and of a reddish-brown colour. The number of inhabitants are computed at about 65,000. Lon. 175. 56 W. Lat. 20. 53 N.

MOWER. *s.* (from *mow.*) One who cuts with a scythe.

MOXA JAPONICA. (*Moxa*, Japanese.) A soft lanuginous substance, prepared in Japan, from the young leaves of a species of mugwort, by beating them when thoroughly dried, and rubbing them betwixt the hands, till only the fine fibres are left. Moxa is celebrated in the eastern countries, for pre-

venting and curing many disorders, by being burnt on the skin; a little cone of it is laid upon the part, previously moistened, and set on fire on the top, burns down with a temperate and glowing heat, and produces a dark-coloured spot, the ulceration of which is promoted by putting a little garlic, and the ulcer either healed up when the eschar separates, or kept running for a length of time, as different circumstances may require. See ARTEMISIA.

MOYLE. See MULE.

MOZART (Wolfgang), the celebrated German musician, was born at Salzburg in the year 1756. His father was also a musician of some eminence.

At the age of three years, young Mozart, attending to the lessons which his sister, then seven years old, was receiving at the harpsichord, became captivated with harmony; and when she had left the instrument, he would instantly place himself at it, find the thirds, sound them with the liveliest joy, and employ whole hours at the exercise. His father, urged by such early and striking indications of genius, immediately began to teach him some little airs; and soon perceived that his pupil improved even beyond the hopes he had formed of him. Half an hour was generally sufficient for his acquiring a minuet or a little song, which, when once learned, he would of himself perform with taste and expression.

At the age of six years he had made such a progress as to be able to compose short pieces for the harpsichord, which his father was obliged to commit to paper for him. From that time nothing made any impression upon him but harmony; and infantine amusements lost all their attractions unless music had a share in them. He advanced from day to day, not by ordinary and insensible degrees, but with a rapidity which hourly excited new surprise in his parents—the happy witnesses of his progress.

His father returning home one day with a stranger, found little Mozart with a pen in his hand. "What are you writing?" said he. "A concerto for the harpsichord," replied the child. "Let us see it (rejoined the father); it is a marvellous concerto without doubt." He then took the paper, and saw nothing at first but a mass of notes mingled with blots of ink by the mal-address of the young composer, who, unskilled in the management of the pen, had dipped it too freely in the ink; and having blotted and smeared his paper, had endeavoured to make out his ideas with his fingers; but on a closer examination, his father was lost in wonder; and his eyes delighted and flowing with tears, became rivetted to the notes. "See (exclaimed he to the stranger) how just and regular it all is! but it is impossible to play it; it is too difficult." "It is a concerto (said the child), and must be practised till one can play it. Hear how this part goes." He then sat down to perform it; but was not able to execute the passages with sufficient fluency to do justice to his own ideas. Extraordinary as his manual facility was universally allowed to be for his age, it did not keep pace with the progress of his knowledge and invention. Such an instance of intellectual advancement, in a child only six years of age, is so far out of the common road of nature, that we can only contemplate the fact with astonishment, and acknowledge, that the possible rapidity of mental maturation is not to be calculated.

In the year 1762, his father took him and his sister to Munich, where he performed a concerto before the elector, which excited the admiration of the whole court: nor was he less applauded at Vienna, where the emperor called him the little sorcerer.

His father gave him lessons only on the harpsichord; but he privately taught himself the violin; and his command of the instrument afforded the elder Mozart the utmost surprise, when he one day at a concert took a second violin, and acquitted himself with more than passable address. True genius sees no obstacles. It will not therefore excite our wonder, if his constant success in whatever he attempted begot an unbounded confidence in his own powers; he had even the laudable hardihood to undertake to qualify himself for the first violin, and did not long remain short of the necessary proficiency.

He had an ear so correct, that he felt the most minute discordancy; and such a fondness for study, that it was frequently necessary to take him by force from the instrument. This love of application never diminished. He every day passed a considerable time at his harpsichord, and generally practised till a late hour at night. Another characteristical trait of real genius; always full of its object, and lost as it were in itself.

In the year 1763 he made, with his father and sister, his first grand musical journey. He visited Paris; and was heard by the French court in the chapel-royal at Versailles, where his talent on the organ was admired even more than on the harpsichord. At Paris the musical travellers gave two concerts, which procured them the highest reputation, and the distinction of public portraits. It was here that a set of sonatas for the harpsichord, some of his earliest compositions, were engraved and published.

From Paris they went to London, where they also gave two concerts, consisting of symphonies composed by young Mozart, who even at that early age sang also with much expression, and practised publicly with his sister. Mozart played already at sight, and in a concert, at which the king was one of his auditors, a bass being placed before him as a ground, immediately applied to it a most beautiful melody. Those who are best acquainted with the extent of such a task will be the most astonished at such mature familiarity with the intricacies of the science, and such prompt and ready invention in so juvenile a mind.

From London, where Mozart also published

six sonatas for the harpsichord, the musical family went to Holland, thence again to France, and in 1766 returned to Salzburg. There this extraordinary youth remained more than a year in perfect repose; devoting the whole of his time to the study of composition, the principles of which he scrutinized with the depth and penetration of confirmed manhood. Emmanuel Bach, Hasse, and Handel, were his chief guides and models; though he by no means neglected the old Italian masters.

In 1768 he again visited Vienna, where Joseph II. engaged him to set to music a comic opera, entitled, La Finta Semplice, which obtained the approbation of Hasse and Metastasio. At the house of the prince of Kaunitz, it often happened that the first Italian air which came to hand would be given him, that in the presence of the company he might add to it accompaniments for numerous instruments; which he would write in the first style of excellence, and without the least premeditation. This is at once a proof with what acuteness of observation he had listened to the music of the best masters; how intimate he had already rendered himself with the characters, capacities, and effects of the different instruments; and what skill he had acquired in that abstruse art of mixed combination which, while it calculates the conjoint effect of sounds, as they regard the established laws of harmony, accommodates the different parts to the scales, tones, and powers of the respective instruments by which they are to be executed. It was at this time also that, although but twelve years of age, he composed the music for the consecration of the church of orphans, at the performance of which he himself presided.

In 1769 Mozart again returned to Salzburg, where he became maitre de concert. Not having yet seen Italy, in December of the same year he set out for that seat of the fine arts. Those talents which had already excited the admiration of Germany, France, and England, now awakened in that land of musical taste the most lively enthusiasm.

In 1771 he had no sooner given personal proofs of his genius, than *la scrittura* for the following carnival was conferred upon him. He visited Bologna, then as famous for harmonic excellence as Naples, where the celebrated theorist Martini was amazed to see a German boy work and execute the theme of a fugue which he presented to him, in the extraordinary style in which Mozart acquitted himself. He next went to Florence. Florence even enhanced the eulogiums which Bologna had lavished upon him.

During the holy week he arrived at Rome, and assisted at the Miserere in the Sixtine chapel; which performance is justly considered as the *ne plus ultra* of vocal music. This circumstance claims particular notice, as inducing a proof of another faculty of his mind, only to be equalled by those wonderful powers which he had already demonstrated. He was prohibited from taking a copy of this Miserere, and therefore piqued himself on retaining it in his memory. Having heard it with attention, he went home, made out a manuscript from recollection, returned the next day to the chapel, heard the piece a second time, corrected the rough draught, and produced a transcript, which surprised all Rome. This Miserere formed a scorer numerous in its parts, and extremely difficult of execution. His mind had embraced and retained the whole!

He soon after received from the pope the order of the gilt spur; and at Bologna was complimented, by an unanimous decision, with the title of member and master of the Philharmonic Academy. As a proof, *pro forma*, of his qualifications for this academical honour, a fugue, for four voices, in the church style, was required of him, and he was shut up alone in his chamber. He completed it in half an hour, and received his diploma. This evinced that he possessed an imagination constantly at his command, and that his mind was stored with all the riches of his beloved science.

The opera which he composed for Milan was called Mithridates. This piece procured him *la scrittura* for the grand opera of the carnival of 1773, which was his Lucio Sulla. At length, after a tour of fifteen months, he returned to Salzburg.

In 1771 Mozart visited Paris; but not relishing the music of that capital, he soon quitted it, and returned to his domestic comforts. In 1781, at the request of the elector of Bavaria, he composed the opera of Idomeneo for the carnival of that year. The general merit of this opera is so great, that it might serve alone for the basis of a distinguished reputation. At his twenty-fifth year he was invited to Vienna, where he continued spreading, as from a centre, the taste of his compositions through all Germany, and the lustre of his name over the whole of Europe.

Of all the virtuosi of the piano forte who then crowded Vienna, Mozart was much the most skilful. His finger was extraordinarily rapid and tasteful, and the execution of his left hand exceeded every thing that had before been heard. His touch was replete with delicacy and expression; and the profound study he had bestowed on his art, gave his performance a style the most brilliant and finished. His compositions had a rapid circulation; and in every new piece the connoisseurs were struck with the originality of its cast, the novelty of the passages, and the energy of the effect.

Joseph II. solicitous for the perfection of the German opera, engaged Mozart to compose a piece. He accordingly produced L'enlevement du Serail; performed for the first time in 1782. It excited the jealousy of the Italian company, who therefore ventured to cabal against it. The emperor, addressing himself to the composer, said, "It is too fine for our ears, my dear Mozart, and most charmingly crowded with notes." "Precisely what it ought to be," replied the spirited musician, who justly suspected that this remark had

been suggested to Joseph by the envious Italians. "Though I cannot describe, as an auricular evidence, (says the faithful author of the biography), the applauses and the admiration which this opera produced at Vienna, yet I have witnessed the enthusiasm it excited at Prague among all the connoisseurs, as well as among those whose ears were less cultivated. It was said, that all which had been heard before was not music: it drew the most overflowing audiences: every body was amazed at its new traits of harmony, and at passages so original, and till then so unheard from wind instruments."

During the composition of this opera, he married Mademoiselle Weber, a distinguished virtuosa; and the piece was supposed to owe to this felicitous circumstance much of that endearing character, that tone of tenderness, and that expression of the softer passions, which form its principal attractions.

The Marriage of Figaro, which was in the highest repute at all the theatres, was in the year 1787 transformed into an Italian opera; and Mozart, at the instance of the emperor, set it to music. This piece was highly received every where, and kept possession of the theatre at Prague during almost the whole of the winter in which it first appeared: numerous extracts were made from it, and the songs and dances of Figaro were vociferated in the streets, the gardens, and the taverns. Mozart came that very winter to Prague, and performed in public on the piano forte. His auditors at all times listened to him with admiration; but whenever he played extempore, and indulged the spontaneous and uninterrupted sallies of his fancy, which he sometimes would for more than half an hour, every one was seized with the most enthusiastic raptures, and acknowledged the unrivalled resources of his imagination. About this time the manager of the theatre contracted with him for the composition of a new opera, which, when produced, was called Il dissoluto Punito, or Don Giovanni. His reputation was now so exalted, that the Bohemians piqued themselves on the circumstance that this opera was composed for their entertainment.

But this fame, this great and universal applause, had not yet produced to the admired artist any solid advantages; he had obtained no place, no settled income; but subsisted by his operas, and the instructions and occasional concerts which he gave. The profits of these proved insufficient for the style which he was obliged to support; and his finances became much deranged. The critical situation in which he now found himself made him resolve to quit Vienna, and seek an asylum in London; to which metropolis he had often been invited: but Joseph nominating him *compositeur de la chambre*, though with a very inadequate salary, he was induced to accept it; and Germany had the advantage of retaining him.

It is lamentable that premature genius too rarely enjoys a long career: the acceleration of nature in the mental powers seems to hurry the progress of the animal œconomy, and to anticipate the regular close of temporal existence.

In the year 1791, Mozart, just after he had received the appointment of *Maitre de chapelle* of the church of St. Peter, and when he was only thirty-five years of age, paid the last tribute; and left the world at once to admire the brilliancy and lament the shortness of his earthly sojournment.

Indefatigable, even to his death, he produced, during the last few months of his life, his three great master-pieces, La Flutte Enchantée, La Clemence de Titus, and a Requiem, his last production. La Flutte Enchantée was composed for one of the theatres at Vienna; and no dramatic olio could ever boast a greater success. Every air struck the audience with a new and sweet surprise; and the *tout ensemble* was calculated to afford the deepest and most varied impressions. This piece had, in fact, so great a number of successive representations, that for a long time it was unnecessary to consult the opera-bill; which only announced a permanent novelty. And the airs selected from it, and repeated throughout the empire, as well in the cottage as in the palace, and which the echoes have resounded in the most distant provinces, favoured the idea that Mozart had actually the design to enchant all Germany with his Flutte Enchantée.

La Clemence de Titus was requested by the states of Bohemia for the coronation of Leopold. The composer began it in his carriage during his route to Prague, and finished it in eighteen days.

Some circumstances attending the composition of the piece which we have already mentioned as the last effort of his genius, are too interesting to be omitted. A short time before his death, a stranger came to him with the request that he would compose, as speedily as possible, a requiem for a catholic prince, who, perceiving himself on the verge of the grave, wished, by the execution of such a piece, to soothe his mind, and familiarise it to the idea of his approaching dissolution. Mozart undertook the work; and the stranger deposited with him as a security 400 ducats, though the sum demanded was only 200. The composer immediately began the work, and during its progress felt his mind unusually raised and agitated. He became at length so infatuated with his requiem, that he employed not only the day, but some hours of the night in its composition. One day, while he was conversing with Madame Mozart on the subject, he declared to her that he could not but be persuaded that it was for himself he was writing this piece. His wife, distressed at her inability to dissipate so melancholy an impression, prevailed on him to give her the score. He afterwards appearing somewhat tranquillized, and more master of himself, she returned the score to him, and he soon relapsed into his former despondency. On the day of his death

he asked for the requiem, which was accordingly brought to his bed: "Was I not right (said he), when I declared that it was for myself I was composing this funeral piece?" And the tears trickled from his eyes. This production of a man, impressed during its composition with a presentiment of his approaching death, is unique in its kind, and contains passages which have frequently drawn tears from the performers.

Only one complaint escaped him during his malady: "I must quit life (said he), precisely at the moment when I could enjoy it free from care and inquietude; at the very time when, independent of sordid speculations, and at liberty to follow my own principles and inclinations, I should only have to write from the impulses of my own heart: and I am torn from my family just when in a situation to serve it." Mozart, at the time of his death, was considerably involved in debt; but Vienna and Prague disputed the honour of providing for his widow and children.

The countenance of this great master did not indicate any thing uncommon. He was small of stature; and, except his eyes, which were full of fire, there was nothing to announce superiority of talent. His air, unless when he was at the harpsichord, was that of an absent man. But when he was performing, his whole physiognomy became changed: a profound seriousness recalled and fixed his eyes; and his sentiments were expressed in every movement of his muscles. Never has a musician more successfully embraced the whole extent of his art, and shone with greater lustre in all its departments. His great operas no less than his most simple songs; his learned symphonies as well as his airy dances—all carry the stamp of the richest imagination, the deepest sensibility, and the purest taste. All his works develope the originality of his genius; and imply a mind great and exalted; an imagination which strikes out for itself a new course. He therefore merits to be ranked with that small number of original geniuses, those *phænomena splendida* who form an epoch in their art, by carrying it to perfection, or giving it an unknown career.

It is in the employment of wind instruments that Mozart displays his greatest powers. His melody is always simple, natural, and full of force; and expresses with precision the sentiments and individual situations of his personages. He wrote with extraordinary facility. La Clemence de Titus, the reader will recollect, cost him the study of but eighteen days; and his requiem, which is equal in length to an opera, was produced in four weeks. It is also worthy of remark, that the overture to his Don Giovanni was not begun till the night before the piece was to be performed. At midnight, after having devoted the evening to amusement, he locked himself up in his study, and composed it in a few hours. His memory was wonderfully retentive, as we may judge from his copying by recollection the miserere at Rome. But a fact equally astonishing is, that, soon discovering the eagerness of people to procure his works, and fearful they might be pirated, it was his constant custom to transcribe from the scores of his sonatas only a part for one hand, and at the public performance to supply the other by memory.

He very early began to display that true dignity of an artist which renders him indifferent to the praises of those who are unqualified to judge. The commendations of the ignorant great he never considered as fame. His hearers, whether the wealthy or the titled, must have acquired some credit for their judgment before he could be ambitious of their applause. Indeed he entertained so just a sense of scientific elevation and importance, that he would insist upon respect. And the least noise or idle babble, while he was at the instrument, excited a displeasure which he was too indignant to conceal. Once, to the honour of his feelings, he suddenly rose from his seat, and left his inattentive auditory to experience the keen though silent reproach of insulted genius.

His mind was by no means unlettered; nor was it embellished with one science alone. He was master of several languages, and had made considerable progress in the mathematics. He was honest, mild, generous, full of frankness; and with his friends had an air at once amiable, gay, and free from the least tincture of pedantry.

Far from viewing with envy the success of others, a weakness too closely interwoven in the general nature of man, he was always just to the talents of his fellow professors, and valued and respected merit wherever he found it; a clearer proof of which cannot be adduced than the following circumstance: at a concert, where a new piece composed by the celebrated Joseph Haydn was performed, a certain musician, who never discovered any thing worthy of praise except in his own productions, did not fail to criticise the music; exclaiming to Mozart, "There now! there again! why, that is not what I should have done:" "No; neither should I (replied Mozart); but do you know why? Because neither you nor I should have been able to conceive it."

MUCAGE. (from *mucus*.) Mucilage.

MUCH. *a.* (*mucho*, Spanish.) 1. Large in quantity; long in time (*Deut.*). 2. Many in number (*Shakspeare*).

MUCH. *ad.* 1. In a great degree; by far (*Hebrews*). 2. To a certain degree (*Mark*). 3. To a great degree (*Baker*). 4. Often, or long (*Granville*). 5. Nearly (*Temple*).

MUCH. *s.* 1. A great deal; multitude in number; abundance in quantity (*Dryden*). 2. More than enough; a heavy service or burden (*Milton*). 3. Any assignable quantity or degree (*South*). 4. An uncommon thing; something strange (*Tillotson*). 5. *To make* MUCH *of*. To treat with regard; to fondle; to pamper (*Sidney*).

MUCH *at one*. Nearly of equal value; of equal influence (*Dryden*).

MU'CHWHAT. *ad.* (*much* and *what.*) Nearly (*Atterbury*).

MU'CHEL. *a.* for *muckle* or *mickle*, (myċel, Saxon.) Much (*Spenser*).

MU'CID. *a.* (*mucidus*, Latin.) Slimy; musty.

MU'CIDNESS. *s.* (from *mucid.*) Sliminess; mustiness (*Ainsworth*).

MUCILAGE. (*mucilege*, French, from *mucus, muci*, Latin; *der schleime*, German.) A peculiar secretion from certain organs of animals and vegetables, the chemical properties of which are the following: it is insipid, highly soluble in water, giving it a thick clammy appearance and feel; insoluble in alkohol; not coagulated by a boiling heat, nor crystallizable, and, after the watery solution has been evaporated to dryness, again soluble in water, without having undergone any material change.

The mucilage of animals appears to be somewhat more albuminous than that of vegetables, and hence they are now generally and correctly distinguished by appropriating the French name of *mucilege* to the vegetable secretion, and the Latin name of *mucus* to the animal. See MUCUS, as also GELATIN.

Vegetable mucilage is contained in every plant that has been hitherto analysed, in some parts more abundantly than in others, as also in some ages, and varying from other circumstances. It appears to be one of the elementary vegetable constituents, and probably by its decomposition in the organs of the plant it is converted into other substances; since it is often extremely abundant in the earlier age of the plant, and lessens as other principles are elaborated.

Mucilage is sometimes found nearly pure exuding from the bark and twigs of many vegetables, by natural and artificial clefts, and hardening in the sun into brittle, nearly transparent, roundish lumps. In this state it may be called gum mucilage. The purest of these gum mucilages are gum-arabic, or gum-senegal, which forms a very valuable article of commerce to the countries that yield it. An inferior sort is often obtained from cracks in plum, peach, pear, and other fruit trees, which is usually of a somewhat deeper colour than amber.

The gum-arabic tree is a species of mimosa (see MIMOSA) which grows in various climates, but especially and abundantly along the whole of the Barbary coast, and particularly about the river Senegal. The gum which makes its appearance about the middle of November, after the soil has been thoroughly saturated with periodical rains, is at first seen to ooze through the trunk and branches; about a fortnight after which it hardens into roundish drops of a yellowish-white, which are beautifully brilliant when they are broken off, and entirely so after being held in the mouth for a short time to dissolve the outer surface: no clefts are made, nor any artificial means used by the Moors to solicit the flow of the gum. The lumps of gum-senegal are usually about the size of partridge-eggs, and the harvest continues about six weeks. The quantity annually sold out of the Senegal country for European consumption is about twelve hundred thousand pounds weight.

This gum is also a very wholesome and nutritious food, thousands of the Moors supporting themselves entirely upon it during the time of harvest. About six ounces is sufficient nutriment for a day; and it is besides mixed with milk, animal broths, and other foods.

The gum-arabic, or that which comes directly from Egypt and the Levant, only differs from the preceding in being of a lighter colour and in smaller lumps: it is also somewhat more brittle.

To obtain gum mucilage from those vessels that do not yield it by exsudation, recourse must be had to boiling with water, and evaporation. These kinds of mucilage, however, will seldom answer as cements, for they will not sufficiently harden by drying, and are more liable to mould, and to become brown and coloured during the requisite evaporation.

Lord Dundonald has obtained gum mucilage from the lichen by the following means.—The lichen employed is the large-leaved moss that grows so abundantly on forest and fruit trees: this, in the north of Europe and in America, grows to the length of a foot or more, giving a nutritious food to deer and other animals. It has an outer skin, and below this is a green resinous substance; the remainder of the plant consists chiefly of gum and of fibrous matter, on which gum has no action. To separate the outer skin and the resinous matter, the plant must be scalded two or three times with boiling water, by means of which the skin will crack, swell, and peel off. After this the remaining substance is to be put into a boiler, with about three quarts of water for every pound of the plant, and about half an ounce of pot-ash or soda, (which assists the extraction) and the boiling should be continued till the liquor acquires a considerable degree of gummy consistence. The liquor is then to be taken out and strained from the plant, and fresh water added to the same material further to exhaust the gum. The several liquors after standing some hours to settle, and then removing the dregs, are to be boiled down in a regulated heat, to the consistence which is required for use, but not further, lest they should burn and become coloured. It requires two, and even three boilings entirely to exhaust the lichen of its mucilage.

Another species of native mucilage, somewhat differing from the preceding, is gum tragacanth. This is a white opake gum in the form of twisted shreds, seldom free from visible impurities, and of a considerably tough, often horny, consistence, so that it cannot be reduced to fine powder without considerable labour. It exsudes from the stem and branches of a very thorny shrub, the astragalus traga

cantha of Linnéus, which grows on the island of Candia, and in other parts of the Levant. The juice dries in the sun, and being collected by the shepherds is sent to Europe without any preparation. It differs from gum-arabic in being, properly speaking, hardly soluble in water; but when it is covered with water it swells prodigiously in the course of a few hours, and absorbs so much of the fluid, as to become soft and pulpy, but will not resolve itself into a liquid by any further addition of water. In this soft pulpy state, it will readily mix with other mucilages, and may be spread thin over any surface, and it then dries into a very firm cement. It is employed much in book-binding mixed with paste, and is found to make a very strong cement.

Chemical properties of Mucilage.—When gum-arabic or other mucilage is distilled per se in vessels arranged so as to detain all the products, there first comes over some pure water, and immediately follows a reddish-brown acid liquor, mixed with a little brownish oil, and much carbonic acid gass, and carburetted hydrogen. This acid liquor is very sour to the taste, has an empyreumatic smell, and has been called the pyromucous acid. The same acid is obtained by the distillation of sugar, farina, and many other vegetable matters.

The action of the nitric acid upon gum mucilage has excited some attention, on account of the many new products produced by the mutual decomposition of these substances, and particularly the formation of a peculiar acid the mucous, which is thus simply called and distinguished from the pyromucous, in consequence of this last being altogether produced by the action of fire, while the mucous is obtained without it. This last is found to be the same as that discovered by Scheele, to be produced by the action of nitric acid on sugar of milk, and which was by him denominated saccho-lactic acid. See the article MILK.

A close and intimate connection has been supposed to exist between mucilage and sugar, partly from the existence in each of the principle of the pyromucous acid, and partly from other facts. Mr. Cruikshank however conceived sugar to be a substance of intermediate oxygenation, between mucilage and vegetable acids. Hence it ought to follow that each is convertible into the other by a due addition or abstraction of oxygen, supposing that the processes of nature can be at all imitated in the laboratory. We possess many proofs that sugar is formed out of mucilage in natural processes: that of germination is one; and sugar plants themselves, at an early period of their growth, contain mucilage alone. By a disoxygenating method, Mr. C. appears very successfully to have converted sugar into gum: but the converse experiment did not succeed, for it was found that gum could not be converted into sugar by any oxygenating process; nitric and oxymuriatic acids forming acids alone with gum, and not saccharine matter.

MUCILA'GINOUS. *a.* (*mucilagineux*, French; from *mucilage*.) Slimy; viscous; soft with some degree of tenacity (*Grew*).

MUCILAGINOUS EXTRACTS, in pharmacy, extracts that readily dissolve in water, scarcely at all in spirits of wine, and undergo spirituous fermentation.

MUCILA'GINOUSNESS. *s.* (from *mucilaginous*.) Sliminess; viscosity.

MUCILAGO, in botany, a genus of the class cryptogamia, order fungi, consisting of most simple, fugacious filaments. Four species:

1. M. plumosa, snow white, feathery.
2. M. cœspitosa; yellow, feathery.
3. M. cinerea; grey; tufted, branched and simple.
4. M. miniata; deep-red, villous.

MUCILAGO AMYLI. A preparation of starch mostly exhibited with opium in the form of glysters in diarrhœas and dysenteries, where the tenesmus arises from an abrasion of the mucus of the rectum.

MUCILAGO ARABICI GUMMI. A demulcent preparation, more frequently used to combine medicines than in any other form.—In the recent London Pharmacopœia this is called mucilago acaciæ, and, with the preceding, forms the only mucilages retained.

MUCILAGO SEMINIS CYDONII MALI. The best form of exhibiting quince seeds as a demulcent.

MUCILAGO TRAGACANTHÆ. In tickling coughs, joined with syrup of mulberries, this forms a pleasant demulcent, and may be exhibited to children, who are very fond of it.

MUCK. *s.* (meox, Saxon.) 1. Dung for manure of grounds (*Glanville*). 2. Any thing low, mean, and filthy (*Spenser*). 3. *To run a* MUCK, signifies, To run madly and attack all that we meet (*Pope*).

To MUCK. *v. a.* To manure with muck; to dung (*Tusser*).

MU'CKENDER. *s.* (*mouchoir*, French.) A handkerchief (*Dorset*).

To MU'CKER. *v. n.* (from *muck*.) To scramble for money; to hoard up (*Chaucer*).

MU'CKERER. *s.* (from *mucker*.) One that muckers.

MU'CKHIL. *s.* (*muck* and *hill*.) A dunghil.

MU'CKINESS. *s.* (from *mucky*.) Nastiness; filth.

MU'CKLE. *a.* (mycel, Saxon.) Much.

MU'CKWORM. *s.* (*muck* and *worm*). 1. A worm that lives in dung. 2. A miser; a curmudgeon (*Swift*).

MU'CKY. *a.* (from *muck*.) Nasty; filthy.

MUCOR. Mould. In botany, a genus of the class cryptogamia, order fungi. Fungus fugacious; heads at first diaphonous, becoming opake, on simple, or branched stems. The species differ according to the arrangement of different botanists. If those which we have noticed as belonging to the genus fuligo be added, the number is swelled to fifteen or sixteen; if the whole be separated into two or three different genera, those properly belonging to the genus mucor are reduced to ten. It comprises, 1. M. mucedo, or common grey

mould, growing so readily on bread, fruits, plants, and other substances in a putrid state. This species rises in clusters; the stalks a quarter of an inch high, pellucid, hollow, and cylindrical; supporting each a single globular head, at first transparent, afterwards dark-grey; which bursts with elastic force, and ejects small round seeds, discoverable by the microscope.

2. M. sphærocephalus: grey, round-headed mucor, growing upon rotten wood, and sometimes upon decayed plants and mosses. The stalks of this are generally black, about a line in height, bearing each at the top a sphærical ball, about the size of a pin's head; its coat or rind is covered with a grey powder, and contains internally a black or fungous spongy down. The coat bursts with a ragged irregular margin.

3. M. lichenoides, or little black, pin-headed mucor: growing in groups near each other, in chasms of the bark of old trees, and upon old park-pales. The stalks are black, about two lines in height, bearing each a single head, sometimes a double or treble one, of the size of mustard or poppy-seeds, of a roundish figure at first, but when burst, often flatted or truncated, and of a black colour. The internal powdery down is black with a tinge of green.

4. M. erisiphe. 5. M. granulosus. Mildew. The first, sessile, white, with brown heads. The second sessile and blackish. The former is the albigo of Wildenow: yet the common corn-mildew is rather the mucor granulosus, or probably a species of œcidium, the rubigo of Wildenow: whose albigo is blight or white-mildew; his rubigo, rust or red-mildew; and his ustilago, smut, or black-mildew. See USTILAGO and HUSBANDRY.

MU'COUS. *a.* (*mucosus*, Latin.) Slimy; viscous (*Brown*).

MUCOUS GLANDS. Glandulæ mucosæ. Muciparous glands. Glands that secrete mucus, such as the glands of the Schneiderian membrane of the nose, the glands of the fauces, œsophagus, stomach, intestines, bladder, urethra, &c.

MU'COUSNESS. *s.* Slime; viscosity.

MUCRONATE. (from μακρος, *long*, according to some; from μικρος, *small*, according to others.) In botany, dagger-pointed. Hence

MUCRONATE LEAF. A dagger-pointed leaf. Terminating in a sharp point like a dagger; as in bromelia ananas. Applied also to the calyx. The diminutive mucronulate is sometimes used.

MU'CULENT. *a.* (from *mucus*, Latin.) Viscous; slimy.

MUCUS. Animal mucilage. In animal chemistry, a fluid secreted by certain glands, and serving to lubricate many of the internal cavities of the body. It has been very generally confounded with other animal secretions; but is distinguished by the following characters, which were deduced by Dr. Bostock from saliva and the mucus liquid of an oyster evaporated to dryness.

It has much the appearance of gum-arabic, excepting that in general it is rather more opake: like gum-arabic it has little taste, dissolves readily in water, and forms an adhesive solution. It does not dissolve in alkohol or in ether. It does not coagulate when heated; nor when concentrated by evaporation does its solution assume the form of a jelly. It is not precipitated by the oxymuriat of mercury, nor by the infusion of galls. The acetat of lead occasions a copious white precipitate when dropt into solutions containing mucus: the superacetat produces a much less striking effect. Nitrat of silver likewise occasions precipitate in solutions containing mucus.

Mucus till of late was supposed to be a gelatinous principle; but Mr. Brande, in a series of valuable experiments inserted in the Philosophical Transactions for 1809, part ii. p. 376, has very sufficiently proved it to be chiefly albuminous. These experiments have also ascertained that albumen is rendered fluid by the possession of its alkaline matter; and that whenever this alkali is parted with, it immediately coagulates. Hence it is completely coagulated by the Voltaic battery, the alkali being sent off to the negative pole, while whatever acid is contained travels to the positive. It is coagulated by alkohol, and by acid, and by heat; all which may be referred to the same principle. The use of this substance is to lubricate and defend the parts upon which it is secreted, as the nose, œsophagus, stomach, intestines, urethra, vagina, &c.

MUCUS (Vegetable). See GUM and MUCILAGE.

MUD. *s.* (*modder*, Dutch.) The slime and uliginous matter at the bottom of still water (*Addison*).

To MUD. *v. a.* (from the noun.) 1. To bury in the slime or mud (*Shakspeare*). 2. To make turbid; to pollute with dirt; to dash with dirt (*Glanville*).

MUD-FISH, in ichthyology. See COBITIS.

MUD-IQUANA. See MURÆNA.

MU'DDILY. *ad.* (from *muddy*). Turbidly; with foul mixture (*Dryden*).

MU'DDINESS. *s.* (from *muddy.*) Turbidness; foulness caused by mud or sediment (*Addison*).

To MU'DDLE. *v. a.* (from *mud.*) 1. To make turbid; to foul (*Prior*). 2. To make half drunk; to cloud or stupify (*Arbuthnot*).

MU'DDY. *a.* (from *mud.*) 1. Turbid; foul with mud (*Shakspeare*). 2. Impure; dark; gross (*Shakspeare.*) 3. Soiled with mud (*Dryden*). 4. Dark; not bright (*Swift*). 5. Cloudy in mind; dull (*Shakspeare*).

To MU'DDY. *v. a.* (from *mud.*) To make muddy; to cloud; to disturb (*Grew*).

MU'DSUCKER. *s.* (*mud* and *suck*). A seafowl (*Derham*).

MUDWA'LL. *s.* (*mud* and *wall.*) 1. A wall built without mortar, by throwing up mud and suffering it to dry (*South*). 2. (*apiaster.*) A bird (*Ainsworth*).

MUDWA'LLED. *s.* (*mud* and *wall.*) Having a mudwall (*Prior*).

To MUE. *v. a.* (*muer*, French.) To moult; to change feathers

MUFF. *s.* (*muff*, Swedish.) A soft cover for the hands in winter (*Cleaveland*).

To MU'FFLE. *v. a.* (from *moufle*, French.) 1. To cover from the weather (*Dryden*). 2. To blindfold (*Shakspeare*). 3. To conceal; to involve (*Sandys*).

To MU'FFLE. *v. n.* (*maffelen*, *moffelen*, Dutch.) To speak inwardly; to speak without clear and distinct articulation (*Holder*).

MUFFLE, in metallurgy, an arched cover, resisting the strongest fire, and made to be placed over coppels and tests in the operations of assaying, to preserve them from the falling of coals and ashes into them; though, at the same time, of such a form, as is no hindrance to the action of the air and fire on the metal, nor to the inspection of the assayer. The muffles may be made of any form, providing they have these conditions; but those used with coppels are commonly made semi-cylindrical; or when greater vessels are employed, in form of a hollow hemisphere. The muffle must have holes, that the assayer may look in; and the fore part of it must be always quite open, that the air may act better in conjunction with the fire, and be incessantly renewed; the apertures in the muffle serve also for the regimen of the fire, for the cold air rushing into the large opening before, cools the bodies in the vessel; but if some coals are put in it, and its aperture before be then shut, with a door fitted to it, the fire will be increased to the highest degree, much more quickly than it can be by the breathing holes of the furnace. See ASSAYING.

MU'FFLER. *s.* (from *muffle*.) 1. A cover for the face (*Arbuthnot*). 2. A part of a woman's dress by which the face was covered (*Shakspeare*).

MUFTI, or MUPHTI, the chief of the ecclesiastical order, or primate, of the mussulman religion. The authority of the mufti is very great in the Ottoman empire; for even the sultan himself, if he would preserve any appearance of religion, cannot, without hearing his opinion, put any person to death, or so much as inflict any corporal punishment.

The election of the mufti is solely in the grand signior, who presents him with a vest of rich sables, &c. If he is convicted of treason, or any great crime, he is put into a mortar, kept for that purpose in the Seven Towers at Constantinople, and pounded to death.

MUG. *s.* A cup or vessel to drink out of.

MUGGLETONIANS, a religious sect, which arose in England, about the year 1657; so denominated from their leader Lodowick Muggleton, a journeyman taylor, who, with his associate Reeves, set up for great prophets; pretending, as it is said, to have an absolute power of saving and damning whom they pleased; and giving out that they were the two last witnesses of God that should appear before the end of the world.

MUGIL. Mullet. In zoology, a genus of the class pisces, order abdominalia. Lips membranaceous, the lower ones carinate inwards; toothless; above the angle of the mouth a hard callus; gill-membrane with seven curved rays; the covers smooth, rounded; body whitish. Five species, as follow:

1. M. cephalus. Common mullet. First dorsal fin five-rayed. Inhabits European seas, and enters rivers: back dusky, varied with blue and green; sides silvery, with broad, dusky, parallel lines, reaching from the head to the tail; belly silvery; scales arranged in parallel rows: two dorsal fins, the first near the middle of the back; tail deeply forked.

The residence of the mullet is the sandy shoals and bays, into which there is an inlet of fresh water: in such situations, they are found all round the shores of Great Britain, where they leave the sand all marked with round holes, the traces of their digging, for they keep constantly rooting like hogs among the mud. When surrounded by a net, the whole shoal frequently escapes by leaping over it; one attempting this mode of escape, and succeeding, is immediately followed by all the rest.

Mullets are also plentiful in the Mediterranean, and along the southern coasts of France. In a certain lake near Martegues, in the south of France, there are vast shoals which enter during spring, the season of copulation among these fishes; after impregnation they return to the sea, but are intercepted by weres of reeds.

Of the milts and roes of the mullet the botargo of the Italians is composed. The materials are taken out entire, and for a few hours covered up with salt; afterwards they are pressed between two boards, dried in the sun for about a fortnight, and are then fit for use. This composition is said to brace a weak stomach, and to give an exquisite relish to wine.

The food of the mullet is mud, or sea-weeds; it never attempts to devour any fish. The flesh is palatable, though at present not a fashionable dish: its flavour greatly depends on the ground where it is fed; if among mud, it constantly tastes and smells of that kind of food.

2. M. albula. First dorsal fin four-rayed. Inhabits America; very much resembles the last.

3. M. crenilabis. Crenated mullet. First dorsal fin with four flexible rays; rays of the second unarmed; lips crenate, the lower bicarinate. Three other varieties, from variety in the size, ciliation, or carination. Inhabits the Red sea; a foot long; scales broad, with a longitudinal brown keel in the middle.

4. M. Chilensis. Dorsal fin single; tail simple. Inhabits the sea round Chili, and the rivers which empty themselves into it: about a foot long: in shape of scales resembles M. cephalus.

5. M. chanos. Dorsal fin single; tail with two wings on each side. Inhabits the Red sea: a yard long; body oblong, silvery, with soft cirrhi, but without teeth; scales broad, rounded, finely striate. A second variety, more than as large again. See Nat. Hist. Pl. CLVI.

MUGWORT. See ARTEMISIA.

MUHLBERG, a town of Upper Saxony, in the margravate of Meissen, with a castle, situate on the Elbe, 19 miles N.W. of Meissen.

and 32 N.W. of Dresden. Lon. 13. 9 E. Lat. 51. 25.

MUHLENBERGIA, in botany, a genus of the class triandria, or digynia. Calyx one-valved, minute, lateral; corol two-valved. One species only, a North American grass, with prostrate culm, and slender panicle at the end of the alternate branches.

MUHLROSE, a town of Upper Saxony, in the Middle Marche of Brandenburg, situate on a navigable canal, which forms a communication by water from Hamburg to Breslaw, nine miles S.W. of Frankfort on the Oder.

MUID, a large measure in use among the French, for things dry. The muid is no real vessel used as a measure, but an estimation of several other measures; as the septier, mine, minot, bushel, &c.

Muid is also one of the nine casks, or regular vessels used in France to put wine and other liquors in. The muid of wine is divided into two demi-muids, four quarter-muids, and eight half-quarter muids, containing 36 septiers.

MUIRKIRK, a town in Ayrshire, seated on the river Ayr, and noted for a considerabe iron work.

MULATTO, a name given in the Indies to those who are begotten by a negro man on an Indian woman, or by an Indian man on a negro woman.

MULBERRY, in botany. See Morus.

Mulberry blite. See Blitum.

MULCH, a term in gardening to denote such strawy dung as is somewhat moist but not rotten. It is found useful for protecting the roots of new-planted, choice trees or shrubs from severe frost in winter, and from being dried by the fierce sun or drying winds in spring and summer before they are well rooted.

MULCT. s. (*mulcta*, Latin.) A fine, a penalty: used commonly of pecuniary penalty.

To Mulct. *v. a.* (*mulcto*, Latin.) To punish with fine or forfeiture (*Bacon*).

MULCIBER, a sirname of Vulcan.

MULE. (*mula*, Latin.) A hybrid or mixt breed from copulation of two distinct species of the same genus; commonly of a male ass with a mare, or of a stallion with a female ass, in which last case the foal or filly is called a hinny.

Among animals there can be no doubt that the power of procreation in the hybrid race is very slender and limited, though the cause of this curious fact has never been ascertained. It has generally been affirmed that the proper mule (the issue of the horse and ass) never propagates: and Mr. John Hunter endeavoured hence to lay down a general law to determine between the species and varieties of animal genera: and published a valuable paper in proof that the wolf, jackal, and dog are only varieties of the same species, merely from facts in his possession, that the young produced by copulation between any of these animals are capable of procreating.

It is not true, however, as an universal proposition, that hybrid animals, or those issuing from the connexion of different species, never propagate. Even mules and hinnies have been occasionally found to propagate in warm climates, and other hybrids in climates of all kinds. Mr. John Hunter threw out a hint, that such cases might probably be the result of a monstrosity in the sexual organs of one of the parents, by which though a hybrid in other respects, it retained in these organs the make and powers of the perfect species. But the hint is supported by no fact whatever, and can only be contemplated as an ingenious loop-hole to escape from an insuperable difficulty.

The translator of Buffon's works has given a remarkable and well authenticated instance of the prolific powers of a she-mule in the north of Scotland. Having heard that a mule, belonging to Mr. David Tullo, farmer in Auchtertyre, in the county of Forfar, had some years ago brought forth a foal, he transmitted a few queries to be put to Mr. Tullo; and requested that his answers might be legally attested before a magistrate. This request was cheerfully complied with; and the following is an exact copy of the queries, answers, and attestations.

Interrogatories to be put to Mr. Tullo, tenant in Auchtertyre, parish of Newtyle, and county of Forfar, with his answers thereto.

1mo, Had you ever a she-mule? At what period? Is it true that the mule had a foal? At what time was she covered? and when did she foal?—Answered by Mr. Tullo: That he bought a she-mule about 20 years ago: That she was constantly in season for a horse: That, some years thereafter, he gave her a horse; and that she thereafter gave him a foal, about the 16th of June. The mule's price was 4l. 5s. sterling.

2do, What was the colour of the foal? Was there any thing particular in its figure?—Answer: The foal was exactly the colour of its mother, inclined to black, with a very large head, big ears, and small tail; and the declarant thinks, had its head been weighed when foaled, it would have weighed nearly as much as its body.

3tio, How long was the animal allowed to live?—Answer: The next day after the mule foaled, it was sent, with its mother, to the Loch of Lundie, in order to let the foal die, as the declarant could not want the mule's work, and the mother seemed not fond of the foal: That it was accordingly left, and next day came to Auchtertyre, about two miles distance, over a hill, with the cattle of Auchtertyre, that had been grazing near that place, and was drowned in a ditch the day following.

4to, Was its skin preserved, or the head, or any other bones of the skeleton? Could any part thereof be still found?—Answer: Neither the skin nor any part of the skeleton was preserved, nor can be now had; though the declarant has often regretted the not preserving the foal, as its mother always performed any work that a horse of 15l. value could do.

5to, Is the mother still alive? What is her

age?—Answer: The mother died about eight years ago, of an epidemic cold that was raging among the horses in this country: the mule had little or no milk after foaling, and the foal got some cow's milk: and this is all that he remembers of the matter. DAVID TULLO.

Auchtertyre, 4th Feb. 1780.—We James Small, tenant in Burmouth, and Robert Ramsay, tenant in Newtyle, hereby certify that we have often seen the mule above described; and we know that she had a foal, as is narrated by David Tullo.

JAMES SMALL. ROB. RAMSAY.

Ballantyne-house, 4th Feb. 1780.—The within interrogatories were put to David Tullo, tenant in Auchtertyre, anent the mule he had, and the foal she produced: to which he gave the answers subjoined to each query, and signed them; as did James Small and Robert Ramsay, attesting the truth thereof, in presence of GEORGE WATSON, J. P.

The original attestation is in the possession of the translator's family, he having before he died transmitted notorial or authenticated copies of it to the count de Buffon, and to Thomas Pennant, esq. of Downing, in Flintshire.

Koelreuter, in like manner, among vegetables found the hybrids of various species to be sterile; and especially those formed by the sexual connexion of different species of tobacco; as for example of the female nicotiana rustica with the male nicotiana paniculata. But we are also in possession of various instances of hybrid plants which retain the original hybrid form, and continue to propagate themselves. We shall quote a few from Wildenow.

Sorbus hybrida. The mother was sorbus aucuparia; the father cratægus aria.

Pyrus hybrida. The mother was pyrus arbutifolia; the father sorbus ancaperia.

Rhammus hybridus. The mother was rhammus alpinus; the father rhammus alaternus.

What mixtures do not the species of pelargenium produce in our gardens? almost all the plants of the Linnéan classes xxi. xxii. xxiii. generate prolific hybrids. When M. Wildenow in conclusion offers a general query, whether from the observations already made upon the hybrids both of the animal and vegetable world, it may not be laid down as a rule, admitting some exceptions, that all hybyrids are productive, but that some only require a warm climate to unfold the male semen? "I do not," continues he, "attempt to establish this rule as quite certain: and should be happy if philosophers would consider the subject more accurately, and more minutely attend to the hybrids of different climates in order to settle the question."

Mules properly so called (the offspring of the horse and the ass) are chiefly used in countries where there are rocky and stony ways, as about the Alps and Pyrenees, &c. Great numbers of them are kept in these places: they are usually black, and are strong, well-limbed, and large, being mostly bred out of the fine Spanish mares. The mules are sometimes fifteen or sixteen hands high, and the best of them are worth forty or fifty pounds a-piece. No creatures are so proper for large burdens, and none so sure-footed. They are much stronger for draught than our horses, and are often as thick-set as our dray-horses, and will travel several months together, with six or eight hundred weight upon their backs. It is a wonder that these creatures are not more propagated in England, as they are so much hardier and stronger than horses, and are less subject to diseases, and will live and work to twice the age of a horse. Those that are bred in cold countries are more hardy and fit for labour than those bred in hot; and those which are light made are fitter for riding than horses, as to the walk and trot; but they are apt to gallop rough; though these do it much less than the short-made ones.

They take so much after the mares they are bred from, that they may be procured of any kind, light or strong, as the owner pleases. The general complaint we make against them, is that they kick, and are stubborn; but this is only owing to our neglect in the breeding them, for they are as gentle as our horses, in countries where they are bred with more care.

Mules are of two kinds; the one between the horse and the she-ass, the other between the he-ass and the mare. The first sort are the least valuable. They are commonly very dull, and take after the ass, and are not large; the other breed is therefore what is propagated chiefly in all countries where mules are used. The largest and finest he-ass must be procured for this breed; and in Spain, where mules are greatly esteemed, they will give fifty or sixty pounds for a fine he-ass, only to be kept as a stallion. They breed with this creature out of the finest and largest mares they have, giving the ass an advantage of height of ground, and putting the mare into a narrow pit, railed on each side. If the ass designed to be bred on is suckled by a mare, or the mare suckled with an ass, it makes them much more familiar than they would otherwise be; and this may always be done by taking away the colt that belongs to the dam, and putting the other in its place, keeping them in the dark ten days or a fortnight.

MULE PLANT. See HYBRID.

MULE PINK, in botany. See DIANTHUS.

MULES in the legs of a horse. See KIBED HEELS.

MULETE'ER. *s.* (*muletier*, Fr.) Mule-driver; horse-boy (*Shakspeare*).

MULHAUSEN, an imperial and hanseatic town of Germany, in Thuringia, under the protection of the elector of Saxony. It is seated in a fertile country, on the Unstrutht, 15 miles N.E. of Eisenach, and 45 E. by S. of Cassel. Lon. 10. 49 E. Lat. 51. 13 N.

MULHAUSEN, a town of Alsace, which, though intirely inclosed within the dominions of France, is not only in alliance with the Helvetic confederacy, but is considered as a part of it, and entitled to all its privileges. The walls of the town inclose a circumference of not more than two miles; and its whole territory is confined within a precinct of eight miles. The town contains 6000 inhabit-

ants, who are protestants; and there are 2000 subjects in its adjacent villages. It owes its present flourishing state to its manufactures, which are chiefly of printed linens and cottons. The government is aristo-democratical. The supreme power resides in the great and little council, consisting together of 78 persons, and drawn from the burghers, whose number amounts to 700, distributed into six tribes. Mulhausen is 15 miles N.W. of Basil. Lon. 7. 24 E. Lat. 47. 48 N.

MULHEIM, a town of Germany, in the electorate of Cologne, seated near the Rhine, three miles from Cologne. Here the few protestants in Colonge are obliged to go to perform divine service.

Mulheim, a town of Westphalia, in the duchy of Berg, situate on the Rhur, 14 miles N. of Dusseldorf. Lon. 6. 51 E. Lat. 51. 26 N.

MULIE'BRITY. *s.* (*muliebris*, Latin.) Womanhood; the correlative to virility.

To MULL. *v. a.* (*mollitus*, Latin.) 1. To soften and dispirit, as wine is when burnt and sweetened (*Shakspeare*). 2. To heat any liquor, and sweeten and spice it (*Gay*).

Mull, one of the Western Islands of Scotland, 25 miles in length, and, in some places, of equal breadth. There are many good natural harbours; but there is only one village, called Tobermorey. The soil is, for the most part, rocky and barren; but the hills abound with springs, and are covered with cattle: these, with the fishery, and a considerable quantity of kelp, are the only articles of commerce. The ruins of several ancient castles are seen on this island.

Mull of Cantyre. See Cantyre.

Mull of Galloway, a rocky promontory, the most southerly point of Scotland, in the county of Wigton.

MULLAT of alumina, in mineralogy. See Mellites.

MULLEIN, in botany. See Verbascum.

MULLER (John), commonly called Regiomontanus, from Mons Regius, or Koningsberg, a town in Franconia, where he was born in 1436, and became the greatest astronomer and mathematician of his time. He was indeed a very prodigy for genius and learning. Having first acquired grammatical learning in his own country, he was admitted, while yet a boy, into the academy at Leipsic, where he formed a strong attachment to the mathematical sciences, arithmetic, geometry, astronomy, &c. But not finding proper assistance in these studies at this place, he removed, at only 15 years of age, to Vienna, to study under the famous Purbach, the professor there, who read lectures in those sciences with the highest reputation. A strong and affectionate friendship soon took place between these two, and our author made such rapid improvements in the sciences, that he was able to be assisting to his master, and to become his companion in all his labours. In this manner they spent about ten years together; elucidating obscurities, observing the motions of the heavenly bodies, and comparing and correcting the tables of them; particularly those of Mars, which they found to disagree with the motions, sometimes as much as two degrees.

About this time there arrived at Vienna the cardinal Bessarion, who came to negociate some affairs for the pope; and, being a lover of astronomy, soon formed an acquaintance with Purbach and Regiomontanus. He had begun to form a Latin Version of Ptolemy's Almagest, or an Epitome of it; but not having time to go on with it himself, he requested Purbach to complete the work, and for that purpose to return with him into Italy, to make himself master of the Greek tongue, which he was as yet unacquainted with. To these proposals Purbach only assented, on condition that Regiomontanus would accompany him, and share in all the labours. They first, however, by means of an Arabic Version of Ptolemy, made some progress in the work; but this was soon interrupted by the death of Purbach, which happened in 1461, in the 39th year of his age. The whole task then devolved upon Regiomontanus, who finished the work, at the request of Purbach, made to him when on his death-bed. This work our author afterwards revised and perfected at Rome, when he had learned the Greek language, and consulted the commentator Theon, &c.

Regiomontanus accompanied the cardinal Bessarion in his return to Rome, being then near 30 years of age. Here he applied himself diligently to the study of the Greek language; not neglecting however to make astronomical observations and compose various works in that science; as his Dialogue against the Theories of Cremonensis. The cardinal going to Greece soon after, Regiomontanus went to Ferrara, where he continued the study of the Greek language under Theodore Gaza; who explained to him the text of Ptolomy, with the commentaries of Theon; till at length he became so perfect in it, that he could compose verses, and read it like a critic. In 1463 he went to Padua, where he became a member of the university; and, at the request of the students, explained Alfraganus, an Arabian philosopher. In 1464 he removed to Venice, to meet and attend his patron Bessarion. Here he wrote, with great accuracy, his Treatise of Triangles, and a Refutation of the Quadrature of the Circle, which Cardinal Cusa pretended he had demonstrated. The same year he returned with Bessarion to Rome; where he made some stay, to procure the most curious books: those he could not purchase he took the pains to transcribe, for he wrote with great facility and elegance; and others he got copied at a great expence. For as he was certain that none of these books could be had in Germany, he thought on his return thither he would at his leisure translate and publish some of the best of them. During this time too he had a fierce contest with George Trabezonde, whom he had greatly offended by animadverting on some passages in his translation of Theon's Commentary.

Being now weary of rambling about, and having procured a great number of manuscripts, which was one great object of his travels, he returned to Vienna, and performed for some time the offices of his professorship, by reading lectures, &c. After being a while thus employed, he went to Buda, on the invitation of Matthias king of Hungary, who was a great lover of letters and the sciences, and had founded a rich and noble library there: for he had bought up all the Greek books that could be found on the sacking of Constantinople; also those that were brought from Athens, or wherever else they could be met with through the whole Turkish dominions, collecting them all together into a library at Buda. But a war breaking out in this country, he looked out for some other place to settle in, where he might pursue his studies, and for this purpose he retired to Noremberg, where he set up a printing-house, formed a nomenclature of the books he meant to publish, and cultivated an intimacy with the celebrated Bernard Walther, who cheerfully co-operated with him in his literary and scientific undertakings. Here he published the New Theories of his master Purbach, the Astronomicon of Manilius, his own New Calendar, Ephemerides, &c. He likewise prepared a new version of Ptolomy's Cosmography.

In 1474, pope Sixtus the 4th conceived a design of reforming the calendar, and sent for Regiomontanus to Rome, as the properest and ablest person to accomplish his purpose. Regiomontanus was very unwilling to interrupt the studies, and printing of books, he was engaged in at Noremberg; but receiving great promises from the pope, who also for the present named him bishop of Ratisbon, he at length consented to go. He arrived at Rome in 1475, but died there the year after, at only 40 years of age; not without a suspicion of being poisoned by the sons of George Trabezonde, in revenge for the death of their father, which was said to have been caused by the grief he felt on account of the criticisms made by Regiomontanus on his translation of Ptolomy's Almagest.

Purbach first of any reduced the trigonometrical tables of sines, from the old sexagesimal division of the radius, to the decimal scale. He supposed the radius to be divided into 600000 equal parts, and computed the sines of the arcs to every ten minutes, in such equal parts of the radius, by the decimal notation. This project of Purbach was perfected by Regiomontanus; who not only extended the sines to every minute, the radius being 600000, as designed by Purbach, but afterwards, disliking that scheme, as evidently imperfect, he computed them likewise to the radius 1000000, for every minute of the quadrant. Regiomontanus also introduced the tangents into trigonometry, the canon of which he called fœcundus, because of the many great advantages arising from them. Beside these things, he enriched trigonometry with many theorems and precepts. Indeed, excepting for the use of logarithms, the trigonometry of Regiomontanus is but little inferior to that of our own time. His Treatise, on both Plane and Spherical Trigonometry, is in 5 books; it was written about the year 1464, and printed in folio at Noremberg in 1533. In the 5th book are various problems concerning rectilinear triangles, some of which are resolved by means of algebra: a proof that this science was not wholly unknown in Europe before the treatise of Lucas de Burgo.

Regiomontanus was author of some other works beside those before mentioned. Peter Ramus, in the account he gives of the admirable works attempted and performed by Regiomontanus, tells us, that in his workshop at Noremberg there was an automaton in perpetual motion: that he made an artificial fly, which taking its flight from his hand, would fly round the room, and at last, as if weary, would return to his master's hand: that he fabricated an eagle, which, on the emperor's approach to the city, he sent out, high in the air, a great way to meet him, and that it kept him company to the gates of the city. Let us no more wonder, adds Ramus, at the dove of Archytas, since Noremberg can shew a fly, and an eagle, armed with geometrical wings. Nor are those famous artificers, who were formerly in Greece and Egypt, any longer of such account, since Noremberg can boast of her Regiomontanuses. For Wernerus first, and then the Schoneri, father and son, afterwards, revived the spirit of Regiomontanus.—(*Hutton's Dict.*)

MULLER (John), a noted engraver, who flourished about the year 1600, and had been bred under Henry Goltzius, whose style he closely imitated. The facility with which he handled the graver (for he worked with that instrument only) cannot be sufficiently expressed; his works must be seen, to convey a proper idea of it to the mind. His engravings are valuable, as productions of a very extraordinary nature; exclusive of which they have a prodigious share of merit. Among his most estimable performances, may be mentioned, 1. The hand-writing on the wall, a middling-sized plate lengthwise, from his own composition. 2. The adoration of the wise men, the same, from the same. Fine impressions of both these prints are very rare. 3. The resurrection of Lazarus, a large plate lengthwise, from Abraham Bloemart. He engraved also several much esteemed portraits.

MULLER, or MULLAR, denotes a stone flat and even at the bottom, but round at top, used for grinding of matters on a marble. The apothecaries use mullers to prepare some of their testaceous powders, and painters for their colours, either dry or in oil. Muller is also an instrument used by the glass-grinders; being a piece of wood, to one end whereof is cemented the glass to be ground. It is ordinarily about six inches long, turned round.

MULLER'S GLASS, in mineralogy. See OLIVINUS.

MULLERA, in botany, a genus of the class diadelphia, order decandria. Calyx four-toothed; loment moniliform, with fleshy

one-seeded globules cohering by a thread. One species only; a Surinam tree with ferruginous branches, and nodding flowers; five leaflets, ovate-oblong, and silky underneath.

MULLERAS, a town of Germany, in the middle marche of Brandenburg, seated on a canal cut between the Spree and Oder, 40 miles S.E. of Berlin. Lon. 14. 31 E. Lat. 52. 14 N.

MULLET, in ichthyology. See MUGIL.

MULLIGRUBS, a low word used sometimes to denote gripes, at others, sullenness.

MULLINGAR, the county town of West Meath, in Ireland. It holds a great wool-mart, is a place of good trade, and sends two members to parliament. It is seated on the Foyle, 38 miles W. of Dublin. Lon. 7. 50 W. Lat. 53. 30 N.

MULLUS. Surmullet. In zoology, a genus of the class pisces, order thoracica. Head compressed, sloping, scaly: eyes oblong, approximate, vertical, furnished with a nictitant membrane; nostrils double, minute; jaws and palate armed with small teeth; tongue short, narrow, smooth, fixed; gill membrane three-rayed; the covers of three pieces, very finely striate; body round, long, red, coated with large scales, easily dropping off. Six species, as follow.

1. M. barbutus Red surmullet. Lower jaw with two cirrhi; body red. Inhabits European, Mediterranean, and Pacific seas; body, when deprived of its scales, red. Nothing can be more beautiful than the colours of this fish when it is dying, and nothing more delicious than its flesh. The ancient Romans held it in such vast repute that prodigious sums were given for them; they were often bought at their weight in pure silver It was in the purchase of this fish, indeed, above all others, that the wealthy senators shewed their extravagance and sensuality. Juvenal and Pliny afford ample testimony of the luxury of their age, which, happily for mankind, has never been equalled in any other period of human society. An instance of sixty-four pounds sterling being paid for a fish of three pounds weight, is recorded by Pliny.

But the manner of dressing and eating these fishes still more than the extravagance of the price, shewed the epicurism of the ancient entertainments. The mullet was not reckoned worth a farthing if he did not die in the hand of your guest. There was water kept in the eating room into which the living animal was put, and from thence conveyed immediately to the stew, where it was dressed, which was also in the same apartment, and under the table; from thence the fish was placed upon it. It was customary to put the mullets into glass vases, that the company might be entertained with the various changes of their rich colours as they lay expiring. It was Apicius, that prince of gluttons, that first hit upon the ingenious invention of suffocating them in the exquisite Carthaginian pickle, and afterwards procuring a rich sauce from their livers.

2. M. surmeletus. Striped surmullet. Cirrhi two; body with four longitudinal yellow lines; fins yellow, the rays chiefly red; head large; eyes round: pupil blue, surrounded with a red ring, iris silvery. Inhabits European, American, and Mediterranean seas: from a span to a foot long; scales silvery, streaked with tawny; feeds on other fishes, testaceous animals, crabs and carcases; is gregarious, and approaches the shore in the spring for the purpose of spawning: its flesh equally delicious with the last.

3. M. Japanicus. Yellow, without stripes; tail forked; cirrhi two: jaws toothless. Inhabits Japan; about six inches long: is hardly to be distinguished from M. barbutus.

4. M. auristamma. Cirrhi two, white; on each side a tawny stripe; tail yellow; teeth small, numerous; tail with a small black spot: scales membranaceous at the edge. Inhabits the Red sea.

5. M. vittatus. Cirrhi two; body with two brown and three yellow stripes on each side; tail obliquely brown: scales finely toothed, with obsolete elevated rivulets. Inhabits the Red sea.

6. M. imberbis. Lower jaw without cirrhi. Inhabits the coast of Malta. See Nat. Hist. Plate CLVI.

MULSE. *s.* (*mulsum*, Latin.) Wine boiled and mingled with honey.

MULTA'NGULAR. *a.* (*multus* and *angulus*, Latin.) Many cornered; having many corners; polygonal.

MULTA'NGULARLY. *ad.* Polygonally; with many corners (*Grew*).

MULTA'NGULARNESS. *s.* The state of being polygonal, or having many corners.

MULTICA'PSULAR *a* (*multu* and *capsula*, Latin.) Divided into many partitions or cells.

MULTICAPSULAR PERICARP. In botany, a fruit of many capsules. Having several pericarps succeeding to a flower. As in altha, trollius, helleborus.

MULTICA'VOUS. *a.* (*multus* and *cavus*, Lat.) Full of holes.

MULTIDENTATE COROL. In botany, a many-toothed corol. Cujus limbus aut petala margine dissecta sunt. Having the border (in a monopetalous corol) or the petals (if it be polypetalous) cut about the edge.

MULTIFA'RIOUS. *a.* (*multifarius*, Lat.) Having great multiplicity; having different respects (*More. Evelyn*).

MULTIFA'RIOUSLY. *ad.* With multiplicity: with great variety of modes (*Bentley*).

MULTIFA'RIOUSNESS. *s.* (from *multifarious*.) Multiplied diversity (*Norris*).

MULTI'FIDOUS. *a.* (*multifidus*, Lat.) Having many partitions; cleft into many branches (*Brown*).

MULTIFIDUS SPINÆ. (*multifidus*, from *multus*, many, and *findo*, to divide.) In anatomy, transverso spinalis lumborum, vel terib sacer. Semi-spinalis internus, sive transverso-spinalis dorsi. Semi-spinalis, sive transverso-spinalis colli, pars interna of Winslow. Transversalis lumborum vulgo sacer. Transversalis dorsi. Transversalis colli of Douglas. The generality of anatomical writers have unnecessarily multiplied the muscles of the spine, and hence their descriptions of these parts are confused, and difficult to be understood. Under the name of multifidus spinæ, Albinus has therefore very properly included those portions of muscular flesh, intermixed with tendinous fibres, which lie close to the posterior part of the spine, and which Douglas and Winslow

have described as three distinct muscles, under the names of transversales, or transverso-spinales, of the loins, back, and neck. The multifidus spinæ arises tendinous and fleshy from the upper convex surface of the os sacrum, from the posterior adjoining part of the ilium, from the oblique and transverse processes of all the lumbar vertebræ, from the transverse processes of all the dorsal vertebræ, and from those of the cervical vertebræ, excepting the three first. From all these origins the fibres of the muscle run in an oblique direction, and are inserted, by distinct tendons, into the spinous processes of all the vertebræ of the loins and back, and likewise into those of the six inferior vertebræ of the neck. When this muscle acts singly, it extends the back obliquely, or moves it to one side; when both muscles act, they extend the vertebræ backwards.

MULTIFLOROUS. In botany, many-flowered. Common to several flowers. A many-flowered stem; as in several species of iris, &c. A many-flowered scape; as in primula officinalis, auricula, polyanthus, &c. Calyx; as in scabiosa, and the class syngenesia; when the component flowers are called florets or floscules. A many-flowered peduncle; as in browallia elata.

MU'LTIFORM. *a.* (*multiformis*, Lat.) Having various shapes or appearances (*Milton*).

MULTIFO'RMITY. *s.* (*multiformis*, Lat) Diversity of shapes or appearances subsisting in the same thing.

MULTILA'TERAL. *a.* (*multus* and *lateralis*, Latin.) Having many sides.

MULTILO'CULAR PERICARP. In botany, a many-celled pericarp. Divided internally into several cells; as in nymphæa.

MULTI'LOQUOUS. *a.* (*multiloquus*, Lat.) Very talkative.

MULTINOMIAL, or MULTINOMINAL ROOTS, in mathematics, are such as are composed of many names, parts, or members; as, $a+b+c+d$, &c.

For the method of raising an infinite multinominal to any given power, or of extracting any given root out of such a power, see a method of M. de Moivre, in Phil. Trans. No. 230.

MULTIPA'ROUS. *a.* (*multiparus*, Lat.) Bringing many at a birth (*Brown*).

MULTI'PARTITE COROL. In botany, a many-parted corol. Multipartite leaf. A many-parted leaf. Divided into several parts almost to the bottom.

MU'LTIPEDE. *s.* (*multipeda*, Lat.) An insect with many feet.

MULTIPLE, MULTIPLEX, in arithmetic, a number which comprehends some other several times.

Thus 6 is a multiple of 2, or, which is the same, 2 is a quota part of 6; 2 being contained in 6 three times. And thus 12 is a multiple of 6, 4, 3; and comprehends the first twice, the second thrice, the third four times, &c.

MULTIPLE RATIO, or PROPORTION, is that which is between multiple numbers.

If the lesser term of a ratio be an aliquot part of the greater, the ratio of the greater to the less is called multiple; and that of the less to the greater sub-multiple.

A sub-multiple number is that contained in the multiple. Thus the numbers 1, 2, and 3, are sub-multiples of 6 and 9.

Duple, triple, &c. ratios; as also sub-duples, sub-triples, &c. are so many species of multiple, and sub-multiple ratios.

MULTIPLE SUPERPARTICULAR PROPORTION, is when one number or quantity contains another more than once, and a certain aliquot part; as $3\frac{1}{2}$ to 1.

MULTIPLE SUPERPARTIENT PROPORTION, is when one number or quantity contains anothers diverse times, and some parts besides; as $4\frac{2}{3}$ to 1.

MULTIPLEX COROL. Many-fold, or having petals lying over each other in two or more folds or rows.

MULTIPLI'ABLE. *a.* (*multipliable*, Fr. from *multiply*.) Capable of being multiplied.

MULTIPLI'ABLENESS. *s.* (from *multipliable*.) Capacity of being multiplied.

MULTIPLICA'BLE. *a.* (from *multiplico*, Latin.) Capable of being arithmetically multiplied.

MULTIPLICA'ND. *s.* (*multiplicandus*, Lat.) The number to be multiplied in arithmetic.

MULTIPLICA'TE. *a.* (from *multiplico*, Lat.) Consisting of more than one (*Derham*).

MULTI'PLICATE FLOWER. A multiplied flower. A sort of luxuriant flower, having the corol multiplied so far as to exclude only some of the stamens. The perianth and involucre seldom, the stamens scarcely ever, constitute a multiplicate flower. It is called a double, triple, or quadruple flower, according to the number of rows in the multiplied corol: and a double flower is the lowest degree of it, or the first essay towards fulness. In common language we improperly call all these variations double flowers.

Polypetalous flowers are not unfrequently multiplied; as in ranunculus and anemone. Monopetalous flowers are very subject to this variety; but very seldom become full, or lose all their stamens.

MULTIPLICA'TION. *s.* (*multiplicatio*, Lat.) 1. The act of multiplying or increasing any number by addition or production of more of the same kind (*Brown*). 2. (In arithmetic.) The increasing of any one number by another, so often as there are units in that number, by which the one is increased. Or, multiplication is the process by which we find a number having the same ratio to the multiplicand as the multiplier has to unity. See ARITHMETIC and ALGEBRA.

MULTIPLICA'TOR. *s.* (from *multiplico*, Lat.) The number by which another number is multiplied.

MULTIPLICATUS FLOS. In botany. A luxuriant flower, whose petals are multiplied so as to exclude a part of the stamina. A multiplied luxuriant flower differs from a full one, the highest degree of luxuriance, in that the petals

of the latter are so multiplied as to exclude all the stamina; whereas those of the former are only repeated or multiplied two, three, or four times, as to the exclusion of only a small part of the essential organs. See MULTIPLICATE FLOWER.

MULTIPLI'CIOUS. *a.* (*multiplex*, Lat.) Manifold: not used (*Brown*).

MULTIPLI'CITY. *s.* (*multiplicité*, Fr.) 1. More than one of the same kind (*South*). 2. State of being many (*Dryden*).

MU'LTIPLIER. *s.* (from *multiply*.) 1. One who multiplies or increases the number of any thing (*Decay of Piety*). 2. The multiplicator in arithmetic (*Cocker*).

To MU'LTIPLY. *v. a.* (*multiplico*, Lat.) 1. To increase in number; to make more by generation, accumulation, or addition (*Job*). 2. To perform the process of arithmetical multiplication (*Brown*).

To MU'LTIPLY. *v. n.* 1. To grow in number (*Wisdom*) 2. To increase themselves (*Shakspeare*).

MULTIPLYING-GLASS, in optics, one wherein objects appear increased in number. It is otherwise called a polyhedron, being ground into several planes, that make angles with each other; through which the rays of light issuing from the same point undergo different refractions, so as to enter the eye from every surface in a different direction.

MULTI'POTENT. *a.* (*multus* and *potens*, Latin.) Having manifold power (*Shakspeare*).

MULTIPRE'SENCE. *s.* (*multus* and *præsentia*, Lat.) The power or act of being present in more places than one at the same time (*Hall*).

MULTI'SCIOUS. *a.* (*multiscius*, Lat.) Having variety of knowledge.

MULTISILIQUÆ. The name of the twenty third order in the Fragments of a Natural Method, in Philos. Bot.; and of the twenty-sixth in the Ordines Naturales, at the end of Linnéus's Genera Plantarum. Comprehending those plants which have several siliques or pods succeeding to each flower. As columbine, hellebore, &c.

MULTI'SONOUS. *a.* (*multisonus*, Lat.) Having many sounds.

MU'LTITUDE. *s.* (*multitudo*, Latin.) 1. The state of being many; the state of being more than one. 2. Number collective; a sum of many (*Hale*). 3. A great number, loosely and indefinitely (*Watts*). 4. A crowd or throng; the vulgar (*Addison*).

MULTITU'DINOUS. *a.* (from *multitude*.) 1. Having the appearance of a multitude (*Shakspeare*). 2. Manifold (*Shaks*.).

MULTI'VAGANT. MULTI'VAGOUS. *a.* *multivagus*, Lat.) That wanders or strays much abroad.

MULTIVALVE GLUME. In botany, a multivalve or many-valved glume. Having more than two valves.

MULTI'VIOUS. *a.* (*multa* and *via*, Lat.) Having many ways; manifold.

MULTO'CULAR. *a.* (*multus* and *oculus*, Lat.) Having more eyes than two (*Derham*).

MULVIA, a large river of Africa, which has its source in Mount Atlas, and dividing the empire of Morocco from the kingdom of Algiers, falls into the Mediterranean Sea.

MUM, a kind of malt-liquor much drank in Germany, and chiefly brought from Brunswick, which is the place of most note for making it. The process of brewing mum, as recorded in the town-house of that city, is as follows. Take 63 gallons of water that has been boiled till one-third part is consumed, and brew it with seven bushels of wheaten malt, one bushel of oatmeal, and one bushel of ground beans. When it is tunned, the hogshead must not be filled too full at first: as soon as it begins to work, put into it three pounds of the inner rind of fir, one pound of the tops of fir and beech, three handfuls of carduus benedictus, a handful or two of the flower of rosa solis; add burnet, betony, marjoram, avens, pennyroyal, and wild thyme, of each an handful and an half; of elder-flowers, two handfuls or more; seeds of cardamum bruised, 30 ounces; barberries bruised, one ounce: when the liquor has worked a while, put the herbs and seeds into the vessel; and, after they are added, let it work over as little as possible; then fill it up: lastly, when it is stopped, put into the hogshead ten new-laid eggs unbroken; stop it up close, and use it at two years end. The English brewers, instead of the inner rind of fir, use cardamum, ginger, and sasafras; and also add elicampane, madder, and red sanders.

MUM. *interject*. A word denoting prohibition to speak; silence; hush (*Hudibras*).

To MU'MBLE. *v. n.* (*mompelen*, Dutch.) 1. To speak inwardly; to grumble; to mutter; to speak with imperfect sound (*Shaks*.). 2. To chew; to bite softly (*Dryden*).

To MU'MBLE. *v. a.* 1. To utter with a low inarticulate voice (*Shakspeare*). 2. To mouth gently (*Pope*). 3. To slubber over; to suppress; to utter imperfectly (*Dryden*).

MU'MBLER. *s.* (from *mumble*.) One that speaks inarticulately; a mutterer.

MU'MBLINGLY. *ad.* (from *mumbling*.) With inarticulate utterance.

To MUMM. *v. a.* (*mumme*, Danish.) To mask; to frolic in disguise (*Spenser*).

MU'MMER. *s.* (*mumme*, Danish.) A masker; one who performs frolics in a personated dress (*Milton*).

MU'MMERY. *s.* (*momerie*, French.) Masking; frolics in masks; foolery (*Bacon*).

MUMMY. (*mumia*, Lat. *mumie*, Fr. A mask or covering for the purpose of concealment.) A dead body preserved according to the Egyptian art of embalming, by being immersed in or stuffed with a variety of antiseptic preparations, and afterwards wrapped round with linen steeped in, or loaded with the same materials. See the article EMBALMING.

MUMMY, in mineralogy. See BITUMEN.

MUMMY (To beat to a). To beat soundly.

To MUMP. *v. a.* (*mompelen*, Dutch.) 1. To nibble; to bite quick; to chew with a continued motion (*Otway*). 2. To talk low

and quick. 3. (In cant language.) To go a begging.

MU'MPER. *s.* (In cant language.) A beggar.

MUMPS. *s.* (*mompelen*, Dutch.) Sullenness; silent anger (*Skinner*).

MUMPS, in medicine, a disease of the parotid gland. See CYNANCHE.

To MUNCH. *v. a.* (*manger*, French.) To chew by great mouthfuls (*Shakspeare*).

To MUNCH. *v. n.* To chew eagerly by great mouthfuls (*Dryden*).

MU'NCHER. *s.* (from *munch.*) One that munches.

MUNCHHAUSIA, in botany, so named from baron Gerlach Adolphus de Munchhausen, a genus of the polyadelphia polyandria class and order. Natural order of calycanthemæ. Salicariæ, Jussieu. Essential character: calyx six-cleft, torulose; petals clawed: stamens in six bodies, four or five in each; pistil superior, with a filiform curved style. There is but one species, viz. M. speciosa, a native of Java and China.

MUND. *s.* Peace, from which our lawyers call a breach of the peace, *mundbreck:* so Edmund is happy peace; Æthelmund, noble peace; Ælmund, all peace (*Gibson*).

MUNDA, an ancient town of Spain, in Granada, 30 miles W.N.W. of Malaga. Lon. 4. 35 W. Lat. 36. 50 N.

MUNDA'NE. *a.* (*mundanus*, Lat.) Belonging to the world (*Glanville*).

MUNDA'TION. *s.* (*mundus*, Latin.) The act of cleansing.

MU'NDATORY. *a.* (from *mundus*, Lat.) Having the power to cleanse.

MUNDEN, or GEMUNDEN, a town of Lower Saxony, in the principality of Calenburg, situate at the confluence of the Werra and the Fulda, where they join to form the Weser. No one who is not a freeman of Munden is to trade beyond this town, but must consign his goods to a factor here; and whatever is brought in a vessel must, by virtue of the staple-right granted and confirmed to this town, be unladen and laden again. The Werra may be navigated by Munden and Hessian vessels, but the latter, on coming to Munden, are not to proceed, without a licence, and even then they must have a Munden master and pay a duty to the town. It is 10 miles N.N.E. of Cassel, and 13 S.W. of Gottingen. Lon. 9. 47 E. Lat. 51. 40 N.

MUNDER, a town of Lower Saxony, in the principality of Calenberg, situate on the Hammel, 18 miles E.S.E. of Munden. Lon. 9. 25 E. Lat. 51. 38 N.

MUNDERKINGEN, a town of Suabia, seated on the Danube, 25 miles S.W. of Ulm. Lon. 9. 43 E. Lat. 48. 15 N.

MUNDIC, in mineralogy. See CUPRUM.

MUNDIFICATION. *s.* (*mundus* and *facio*, Lat.) Cleansing any body, as from dross (*Quin.*).

MUNDI'FICATIVE. *a.* (*mundus* and *facio*, Latin.) Cleansing; having the power to cleanse (*Brown*).

To MU'NDIFY. *v. a.* (*mundus* and *facio*, Lat.) To cleanse; to make clean (*Harvey.*)

MUNDI'VAGANT. *a.* (*mundivagus*, Lat.) Wandering through the world.

MUNDU'NGUS. *s.* Stinking tobacco (*Phil.*)

MU'NERARY. *a.* (from *munus*, Lat.) Having the nature of a gift.

MUNGOS RADIX. Radix serpentum. This bitter root of the plant ophiorrhiza mungos of Linnéus is much esteemed in Java, Sumatra, &c. as preventing the effects which usually follow the bite of the naja, a venomous serpent, with which view it is eaten by them. It is also said to be exhibited medicinally in the cure of intestinal worms.

MU'NGREL. *s.* Any thing generated between different kinds; any thing partaking of the qualities of different causes or parents (*Shakspeare*).

MU'NGREL. *a.* Generated between different natures; base-born; degenerate (*Shak.*).

MUNICH, a city of Germany, in the circle of Bavaria, situated on the Iser, the capital and residence of the elector. The straight and broad streets of this place, and the great number of fine buildings in it, both ecclesiastical and secular, render it one of the handsomest cities in all Germany, and even in Europe; and it is said to contain 40,000 inhabitants. The palace here, which was first erected by the emperor Maximilian I, is an elegant structure, containing four courts. The things the most worthy of notice in this palace are, the large and beautiful Kaisersaal, a chapel of the Virgin Mary, with a rich treasury in it; the antiquarium, or chamber of antiquities, in which are 200 marble statues and busts of Roman emperors, and some hundreds of other antiques, the greatest part of which were brought from Italy; the chamber of rich curiosities; the musæum and the elector's library. In the year 1729, the palace, and particularly the chamber of rich curiosities here, suffered greatly by fire, and, in 1750, a whole wing of it was burned down. Towards the east stands the elector's arsenal, and northward lie the park and pleasure gardens, and near these is the Thurnierhaus, or large edifice for tournaments. In the largest market-place stands a high marble pillar, with a brass statue of the Virgin Mary upon it, and two large fountains, and on the sides is the town-house, in which the states hold their meetings, together with several lofty houses, ornamented with decorations of paintings on the front. The principal ecclesiastical buildings here are the collegiate church, and several rich convents. In Munich are manufactures of velvet, silk, wool, and tapestry. It is probable that the ancient city of Campodunum, or Campidonum, stood in this neighbourhood. About the year 1175, duke Henry the Lion built the city of Munich on a spot belonging to the convent of Schoftlar. In 1327, it was greatly damaged by fire, and in 1448, almost entirely destroyed. In 1632, it was taken by the Swedes, and in 1704, 1742, and 1743, by the Austrians, who, in the last mentioned year, established a commission

of regency at this place: 200 miles W. Vienna, and twenty-nine S.E. Augsburg. Lon. 11. 36 E. Lat. 48. 10 N.

MUNICIPAL, in the Roman civil law, an epithet which signifies invested with the rights and privileges of Roman citizens. See MUNICIPIUM.

MUNICIPAL, among us, is applied to the laws that obtain in any particular city or province. And those are called municipal officers who are elected to defend the interests of cities, to maintain their right and privileges, and to preserve order and harmony among the citizens; such as mayors, sheriffs, consuls, &c.

MUNICIPES, an appellation given by the Romans to the inhabitants of the *municipia* or municipal cities. See MUNICIPIUM.

MUNICIPIUM, in Roman antiquity, a corporation, borough, or enfranchised city or town, where the inhabitants enjoyed their own laws and customs, and at the same time were honoured with the privileges of Roman citizens; but then this privilege generally reached no further than the bare title. Some indeed, by particular merit, obtained the liberty of votes, which occasioned that distinction of *municipium sine suffragio*, and *municipium cum suffragio*. The inhabitants of the *municipium sine suffragio* were called barely *Romani*, but those of the *municipium cum suffragio* were called *cives Romani*.

MUNIENT SLEEP. When the upper leaves of a plant, which during the day had spread out horizontally on long petioles, drop them at night, and hang down so as to form an arch all round about the stem.

MUNI'FICENCE. *s.* (*munificentia*, Lat.) Liberality; the act of giving (*Addison*).

MUNI'FICENT. *a.* (*munificus*, Latin.) Liberal; generous (*Atterbury*).

MUNI'FICENTLY. *ad.* Liberally; generously.

MU'NIMENT. *s.* (*munimentum*, Lat.) 1. Fortification; strong hold. 2. Support; defence (*Shakspeare*). 3. Record; writing upon which claims and rights are founded.

To MUNI'TE. *v. a.* (*munio*, Latin.) To fortify; to strengthen: not in use (*Bacon*).

MUNI'TION. *s.* (*munitio*, Latin.) 1. Fortification; strong hold (*Hale*). 2. Ammunition; materials for war (*Fairfax*).

MU'NNION. *s.* The upright post, that divides the lights in a window frame (*Moxon*).

MUNKACS, a town of Hungary: the castle is almost impregnable, seated on a high and steep rock, in a spacious plain, the natural strength of which is increased by art and labour. It is the capital of a lordship, formerly bearing the title of a duchy. Beneath it, on the river Latortza, is a town, which is the residence of a Greek bishop, united with the Roman church, and a convent, of the order of St. Basil. In 1688, after a blockade of three years, this famous castle surrendered to the Imperialists; count Tekely's lady, who had conducted this long defence, being carried to Vienna; and besides the Tekely family, vast treasures in money were found here. In 1703, this was the place of rendezvous to the Rakotzy party, but by suppression of that revolt, this castle escheated to the crown: fifty-two miles E.S.E. Caskau, and 128 S.S.E. Cracow. Lon. 39. 24 E. Lat. 48. 15 N.

MUNSTER (Sebastian), a learned writer, was born at Ingelheim, and became a Cordelier; but having embraced Luther's sentiments, he quitted that order in 1529, and retired to Heidelberg, and afterwards to Basil, where he taught with reputation. He was a man of great candour, and void of ambition; and was so well skilled in geography, the mathematics, and the Hebrew tongue, that he was surnamed the Esdras and the Strabo of Germany. His Latin translation of the bible is esteemed. He was the first who wrote a Chaldee grammar and lexicon: he also published a treatise on cosmography, and several other works. He died of the plague at Basil in 1552, aged 63.

MUNSTER, in Latin *Monomia*, and in Irish *Moun*, the most southerly province of Ireland; bounded on the north by Leinster and Connaught, and on the east, west, and south, by the ocean. It contains the counties Cork, Clare, Kerry, Limerick, Tipperary, and Waterford; and 3,289,932 Irish plantation acres, 740 parishes, 63 baronies, and 26 boroughs. It is about 125 miles long, and 120 broad; and its principal town is Cork. Its ancient name was Mumhan; and in latter ages it was divided into Desmond or South Munster, Ormond or East Munster, and Thomond or North Munster. It lies between 51. 15. and 53. 0. N. lat. and 7. 10. to 10. 40. W. lon.

MUNSTER, a sovereign bishopric of Germany, in the circle of Westphalia, 120 miles long and 80 broad; bounded on the N. by the counties of Bentheim and Steinfort, on the E. by the bishoprics of Osnaburgh and Paderborn, on the S. by the county of Marck, and on the W. by the duchy of Cleves and county of Zutphen. The river Embs runs through it from E. to W.

MUNSTER, a large and populous city of Westphalia, capital of a bishopric of the same name, and of all Westphalia. It was free and imperial till 1661; but to keep the inhabitants in awe, a citadel was built, which stands distinct from the city. In 1533, a taylor, called John of Leyden, made himself master of the city, and drove away the bishop and magistrates; but it was retaken in 1536, after fourteen months siege, and this fanatic was tortured to death with red hot pincers. The famous treaty, called the treaty of Westphalia, was concluded here in 1648, which ended the religious wars of 30 years continuance. It is seated on the Aa, 70 miles N. by E. of Cologne, and 77 S. by W. of Bremen. Lon. 7. 39 E. Lat. 52. 0 N.

MUNTING (Abraham), an excellent botanist, who published several works, the chief of which was his Phitographia Curiosa, printed at Amsterdam in 1727. He died in 1683.

MUNTINGIA, in botany, a genus of the class polyandria, order monogynia. Calyx

five-parted; corol five-petalled; berry five-celled, one-seeded. One species only: a Jamaica shrub, with hairy branches; leaves alternate, oblique, ovate-lanceolate, serrate, hoary-downy, beneath viscid; with a sphærical succulent berry.

MUNYCHIA, an anniversary solemnity observed at Athens, in honour of Diana, on the 16th of the month Munychion. Cakes were offered on the occasion called αμφιφωντες.

MUNYCHION, the tenth month of the Athenian year, containing 29 days, and answering to the latter part of our March and the beginning of April. It was so called from the festival Munychia, which was observed in this month. See MONTH and MUNYCHIA.

MUPHTI. See MUFTI.

MURÆNA. Eel. In zoology, a genus of the class pisces, order apodalia. Head smooth; nostrils tubular; gill-membrane with ten rays: eyes covered with a common skin: body round, smooth, mucous; caudal, dorsal, and anal fins united: spiracle behind the head or pectoral fins.

In forming this genus, nature seems to have made a near approach to the reptile tribes; like these animals, the body is long, slender, and flexible. Excepting the small pair of pectoral, it may be said to have no fins; for the dorsal, anal, and tail fins are united in one web, which surrounds a large portion of the body. The apertures to the gills are small, and placed behind the pectoral fins: they are covered by ten branchiostegous rays.

The eel differs from almost every other fish of that order, of which it is placed at the top, in the manner of its generation. It is viviparous, and is impregnated in the same manner as obtains among the cartilaginous tribes. The ancients entertained very extravagant notions concerning the generation of these animals. Aristotle asserted that they were neither male nor female, had no ova nor semen. Hence it was believed that they sprung from the mud, or that the incrustations scraped from their bodies by the stones received animation. Rondeletius rashly adopted this opinion, from having observed that they were generated in pools, from which all the mud and water had been for a while extracted. This was a phenomenon, for which they could in no other way account than by the spontaneous generation of eels: but later observations have ascertained, that ponds are often supplied with these fish, in the same manner that vegetation is spread, by transporting the seeds of plants. The heron, or other water fowl, may drop the eel, when carrying it to its young, or the young may be ejected unhurt from its bowels, as the seeds of plants are voided by land birds, without being injured by the operation of the stomach.

In their habitation, the fishes of this genus are still more singular than in their manner of propagating their young. They can reside either in salt or fresh water; and what is still more surprising, they are in some measure independent of either; for they sometimes leave their native element, and wander, during night, along the dewy meadows, not only for a change of habitation, but in quest of prey. Of these nightly excursions the snail is commonly the victim, being devoured by the eel as it passes along.

There is no animal more vivacious than the eel: when drawn from the water, it will survive blows that would have killed an animal ten times its size; and even after it is cut asunder, the different parts are seen to move. It is, however, so easily destroyed by cold, that to avoid it, it beds itself deep among the mud, and continues, like the serpent tribe, in a torpid state during winter. Some have been known to take shelter under a rick of hay in severe weather, and even there, have all perished from excess of cold. Though fond of hiding themselves in the mud, they are incapable of living in thick turbid water; and hence, when a river is disturbed by a flood, they are frequently suffocated by the impurity of the stream.

The genus muræna comprises nine species, as follow:

1. M. helena. Roman eel. Without pectoral fins: body variegated. There is a variety spotted with black and green. Inhabits European and American seas; is exceedingly voracious; bites dangerously, and was regarded by the Romans as one of the greatest luxuries of the table. It was often kept in reservoirs appropriated to this purpose, and is said to have been sometimes so completely tamed as to obey the signal of its master, and come to him for food. According to Pliny, that tyrannical wretch, Vedius Pollio, was accustomed to throw his slaves, when they had displeased him, into these reservoirs, to be devoured by this voracious animal, a barbarity for which he was severely chastised by Augustus.

2. M. colubrina. Snake eel. Without pectoral fins; body alternately annulate with yellow and black bands. Another variety with brown irids spotted with black. Inhabits Amboina; and has very much the appearance of the anguis scytale.

3. M. meleagris. Speckled eel. Body blackish, thickly speckled with white. Inhabits the Southern ocean: about two feet long.

4. M. ophis. Spotted sea-serpent. Body slender, spotted; tail round, spear-shaped, naked. Inhabits European seas: from three to four feet long.

5. M. serpens. Serpent eel. Tail naked; body round; pectoral fin with about sixteen rays. Inhabits the southern European seas.

6. M. anguilla. Common eel. Lower jaw longer: body of one colour, in muddy waters black, beneath yellowish; in gravelly, clear waters, green or brownish; beneath silvery, sometimes varied with brown lines; head small, narrowed on the fore-part; mouth large; beneath each eye a small orifice, and at the end of the nose two others small and tubular; teeth small, sharp, numerous; eyes small, near the end of the nose; pupils black, iris golden; aperture of the gills semilunar;

body a little compressed; lateral line straight dotted with white; skin covered with soft oblong scales; pectoral fins small, round, paler, with about nineteen rays; dorsal, caudal, and anal fins united, frequently edged with white. Inhabits almost every where in fresh waters, but is said not to be found in the Danube or any of its branches, though plentiful in the Rhine: grows sometimes to the length of six feet, and weighs twenty pounds; in its appearance and habits something resembling the serpent tribe; during the night quits its element, and wanders along meadows in search of snails and worms; beds itself deep in the mud in winter, and continues in a state of rest; is very impatient of cold, and tenacious of life; the flesh of such as have running water very excellent: has a hundred and sixteen vertebræ; is viviparous.

7. M. mytus. Flat-tailed sea-serpent. Fin surrounding the lower part of the body white, edged with black. Another variety, entirely cinereous. Inhabits European seas. The second variety suspected of being poisonous.

8. M. conger. Conger eel. Lower jaw rather shorter than the upper: nose with two tentacles; lateral line whitish, with a row of spots.

This species often grows to an enormous size. Some specimens have been found eighteen inches in circumference, and ten feet long, weighing upwards of an hundred pounds. A fishery of congers established at Mount's Bay, in Cornwall, forms a very considerable article of commerce. They are annually exported to Spain and Portugal in a dried state, where they are grinded down into a kind of powder, and are used in enriching their soups.

They are caught by a sort of line called a bulter, baited with pilchards; when taken, they are slit up, that a part of the fat may exude from them before they are salted, and fit for use; and so considerable is the quantity of juice that thus escapes, that a fish of a hundred weight will not dry to above twenty-five pounds. M. Pennant supposes that a fishery of congers might be established with advantage in the Hebrides, could the aversion of the natives to this tribe be overcome.

This species is distinguished by the same voracity as the former; it devours other fish, crabs, and even carcases. The mode of its generation is probably the same with the common eels; but, however this be, it is certainly prolific, for the number of its young that annually ascends the Severn is prodigious; they are there called elvers, and during the month of April swarm in such shoals, that they are thrown out upon the shore with small sieves made of hair, and fixed to the end of a pole: a man will in this manner take out as many at one tide as will fill a bushel.

9. M. guttata. Glaucous, speckled with black, with a larger spot on each side near the head. Inhabits Arabia. See Nat. Hist. Pl. CLVII.

MU'RAGE. *s.* (from *murus*, Latin.) Money paid to keep walls in repair.

MU'RAL. *a.* (*muralis*, Lat.) Pertaining to a wall (*Evelyn*).

Mural-crown, among the ancient Romans. See Crown.

Mural-arch, is a wall, or walled arch, placed exactly in the plane of the meridian, i. e. upon the meridian line, for the fixing of a large quadrant, sextant, or other instrument, to observe the meridian altitudes, &c. of the heavenly bodies. Tycho Brahe was the first who used a mural arch in his observations; after him Hevelius, Mr. Flamstead, De la Hire, &c. used the same means.

Mural quadrants have usually been made from five to eight feet in radius. The figure in the upper part of plate 116 represents the instrument as already fixed to the wall. The frame is formed of flat bars, and strengthened by edge bars affixed underneath perpendicularly to them. The radii HB, HA, being divided each into four equal parts, serves to find out the points D and E, by which the quadrant is freely suspended on its props or iron supports that are fastened securely in the wall.

One of the supports E is represented separately in *e* on one side of the quadrant. It is moveable by means of a long slender rod EF or *ef*, which goes into a hollow screw in order to restore the instrument to its situation when it is discovered to be a little deranged. This may be known by the very fine perpendicular thread HA, which ought always to coincide with the same point A of the limb, and carefully examined to be so by a small magnifying telescope at every observation. In order to prevent the unsteadiness of so great a machine, there should be placed behind the limb four copper ears with double cocks I, K, I, K. There are others along the radii HA and HB. Each of these cocks contains two screws, into which is fastened the ears that are fixed behind the quadrant.

Over the wall or stone which supports the instrument, and at the same height as the centre, is placed horizontally the axis PO, which is perpendicular to the plane of the instrument, and which would pass through the centre if it was continued. This axis turns on two pivots P. On this axis is fixed at right angles another branch ON, loaded at its extremity with a weight N capable of equipoising with its weight that of the telescope LM; whilst the axis, by its extremity nearest the quadrant, carries the wooden frame PRM, which is fastened to the telescope in M. The counterpoise takes off from the observer the weight of the telescope when he raises it, and hinders him from either forcing or straining the instrument.

The lower extremity (V) of the telescope is furnished with two small wheels, which take the limb of the quadrant on its two sides. The telescope hardly bears any more upon the limb than the small friction of these two wheels; which renders its motion so extremely easy and pleasant, that by giving it with the hand only a small motion, the telescope will run of itself

over a great part of the limb, balanced by the counterpoise N.

When the telescope is to be stopped at a certain position, the copper hand T is to be made use of, which embraces the limb and springs at the bottom. It is fixed by setting a screw, which fastens it to the limb. Then, in turning the regulating screw, the telescope will be advanced; which is continued until the star or other object whose altitude is observing be on the horizontal fine thread in the telescope. Then on the p ate X, supporting the telescope, and carrying a vernier or nonius, will be seen the number of degrees and minutes, and even quarter of minutes, that the angular height of the object observed is equal to. The remainder is easily estimated within two or three seconds nearly.

There are several methods of subdividing the divisions of a mural quadrant, which are usually from five to ten minutes each; but that which is most commonly adopted is by the vernier or nonius, the contrivance of Peter Vernier a Frenchman. This vernier consists of a piece of copper or brass, CDAB, which is a small portion of X, represented separately. The length CD is divided into 20 equal parts, and placed contiguously on a portion of the division of the limb of the quadrant containing 21 divisions, and thereby dividing this length into 20 equal parts. Thus the first division of the vernier piece marked 15, beginning at the point D, is a little matter backward, or to the left of the first division of the limb, equal to 15″. The second division of the vernier is to the left of the second division of the limb double of the first difference, or 30″; and so on unto the twentieth and last division on the left of the vernier piece; where the 20 differences being accumulated each of the twentieth part of the division of the limb, this last division will be found to agree exactly with the 21st division on the limb of the quadrant.

The index must be pushed the 20th part of a division, or 15″, to the right; for to make the second division on the vernier coincide with one of the divisions of the limb, in like manner is moving two 20ths, or 30″, we must look at the second division of the index, and there will be a coincidence with a division of the limb. Thus may be conceived that the beginning D, of the vernier, which is always the line of reckoning, has advanced two divisions, or 30″, to the right, when the second division, marked 30 on the vernier, is seen to correspond exactly with one of the lines of the quadrant.

On the side of the quadrant is placed the plate of copper which carries the telescope. This plate carries two verniers. The outer line CD divides five minutes into 20 parts, or 15″ each. The interior line AB answers to the parts of another division not having 90°, but 96 parts of the quadrant. It is usually adopted by English astronomers on account of the facility of its subdivisions. Each of the 96 portions of the quadrant is equivalent to 56′ 15″ of the usual divisions. It is divided on the limb into 16 parts, and the arch of the vernier AB contains 25 of these divisions; and being divided itself into 24, immediately gives parts, the value of each of which is 8″ 47⅓‴. See NONIUS and VERNIER.

MURANT (Emanuel), a much-admired landscape painter, was born at Amsterdam in 1622 He had the happiness to be a disciple of Philip Wouwermans, from whom he acquired that warmth and brilliancy of colouring, and that exquisite pencil, which have rendered him deservedly eminent. His subjects were views in Holland, villages, towns, cities, ruins of houses, and decayed castles; all of them exactly sketched after nature, and so exquisitely finished, that every minute part of a building was perfectly discernible, and even every particular stone or brick might be counted by the assistance of a convex glass. But this demanded so much patience and time, that it was impossible for him to paint many pictures; and on that account they are exceedingly scarce, and sold for such prices as must place them out of the reach of all ordinary purchasers. He died in 1700.

MURATORI (Louis Anthony), an Italian writer, was born near Bologna in 1672. The duke of Modena made him his librarian, and keeper of the archives of his duchy. He died in 1750, leaving several learned works behind him, the chief of which are, 1. Rerum Italicarum Sciptores ab Ann. 500 ad. 1500, 27 vols. fol.; 2. Antiquitates Italicæ medii Ævi, sive Dissertationes de moribus Italici Populi, ab inclinatione Romani imperii, usque ad An. 1500, 6 vols. fol.

MURCIA, the pagan goddess of idleness. The name is taken from *murcus* or *murcidus*, an obsolete word, signifying a dull, slothful, or lazy person. The statues of this goddess were always covered with dust and moss, to express her idleness and negligence. She had a temple in Rome, at the foot of the Aventine mount.

MURCIA, a kingdom in Spain, bounded on the north by New Castile, on the east by the kingdom of Valencia, on the west by Andalusia and Granada, and on the south by the Mediterranean Sea. It is about 62 miles in length, and 58 in breadth; and its principal river is Segura. The soil is dry, because it seldom rains, and therefore it produces little corn or wine; but there is plenty of oranges, citrons, lemons, olives, almonds, mulberries, rice, pulse, and sugar. It has also a great deal of silk. It was taken from the Moors in 1265. The air is very healthful.

MURCIA, a large, handsome, and populous town of Spain, capital of a kingdom of the same name. It is a bishop's see, and contains six parishes. The cathedral is a most superb edifice, with the stairs of the steeple so contrived that a man may ride up to the top, either on horseback or in a coach. It is situated in a pleasant plain, which abounds in fine gardens about the city, in which are the best fruits in Spain. It is seated on the river Segura, in lon. 0. 36 W. Lat. 37. 48 N.

MURDER, or MURTHER, the act of killing another with violence and injustice. The word comes from the Saxon *morth*, death; which some will have to signify a violent death; whence the barbarous Latin *murdrum* or *mordrum*. Among the number of popular errors is the notion which has obtained, that the dead body would bleed in the presence or upon the touch of the murderer. The crime of murder is punished with death in almost all nations. See HOMICIDE and MANSLAUGHTER.

The punishment of murder, and that of manslaughter, were formerly one and the same; both having the benefit of clergy: so that none but unlearned persons, who least knew the guilt of it, were put to death for this enormous crime. But now, by several statutes, the benefit of clergy is taken away from murderers through malice prepense, their abettors, procurers, and counsellors. In atrocious cases it was frequently usual for the court to direct the murderer, after execution, to be hung upon a gibbet in chains near the place where the fact was committed; but this was no part of the legal judgment; and the like is still sometimes practised in the case of notorious thieves. This, being quite contrary to the express command of the Mosaical law, seems to have been borrowed from the civil law; which, besides the terror of the example, gives also another reason for this practice, viz. that it is a comfortable sight to the relations and friends of the deceased. But now in England, it is enacted by statute 25 Geo. II. c. 37. that the judge, before whom any person is found guilty of wilful murder, shall pronounce sentence immediately after conviction, unless he sees cause to postpone it; and shall in passing sentence direct him to be executed on the next day but one (unless the same shall be Sunday, and then on the Monday following), and that his body be delivered to the surgeons to be dissected and anatomized; and that the judge may direct his body to be afterwards hung in chains, but in nowise to be buried without dissection. And, during the short but awful interval between sentence and execution, the prisoner shall be kept alone, and sustained with only bread and water. But a power is allowed to the judge, upon good and sufficient cause, to respite the execution, and relax the other restraints of this act.

To MU'RDER. *v. a.* (from the noun.) 1. To kill a man unlawfully (*Dryden*). 2. To destroy; to put an end to (*Shakspeare*).

MU'RDERER. *s.* (from *murder.*) One who has shed human blood unlawfully (*Sidney*).

MU'RDERESS. *s.* (from *murder.*) A woman that commits murder (*Dryden*).

MU'RDERMENT. *s.* (from *murderer.*) The act of killing unlawfully: not used (*Fairf.*).

MU'RDEROUS. *a.* Bloody; guilty of murder; addicted to blood (*Prior*).

MURE. *s.* (*mur*, French; *murus*, Latin.) A wall: not in use (*Shakspeare*).

To MURE. *v. a.* To enclose in walls (*Knolles*).

MU'RENGER. *s.* (*murus*, Latin.) An overseer of a wall (*Ainsworth*).

MURETUS (Marc Anthony), a learned critic, was born at Muret near Limoges, in France, in 1526. He recited in 1552, in the church of the bernardines at Paris, an oration De dignitate ac præstantia studii theologici, but, the year following, was thrown into prison for an unnatural crime. However he was released, and went to Toulouse, where he read lectures in civil law; but was there guilty of the same offence, on which he fled into Italy, and in 1576 entered into orders. He died in 1585. His works have been printed in several volumes: they consist of orations, poems, epistles, and translations of Greek authors.

MUREX. Purple-fish. In zoology, a genus of the class vermes, order testacea. Animal a limax; shell univalve, spiral, rough with membranaceous sutures; aperture oval, ending in an entire, straight or slightly ascending canal. A hundred and eighty-one species, scattered through the different seas of the globe; seven or eight common to our own coasts. They may be thus subdivided:

A. Spinous, with a produced beak: of which the most valuable is,

1. M. tribulus; thorny woodcock. Shell ovate with a triple row of setaceous spines, the beak elongated, subulate with similar spines; shell whitish, or reddish, transversely striate. Inhabits Asia, America, and the Red sea: very rare.

B. Sutures expanding into crisped foliations; beak abbreviated; constituting the tribe of purpura, of purple-fish properly so called. This tribe includes thirteen species, chiefly inhabitants of Asia and America.

C. With thick, protuberant, rounded sutures. Twenty-two species, chiefly of the Eastern or Pacific seas: some mere fossils.

D. More or less spinous, and without manifest beak. The following is worthy of notice:

2. M. loco. Shell subovate and knotty on the fore-part; aperture toothless and suborbicular. Inhabits the Chinese shores: shell about four or five inches long: the animal often eaten by the natives, and contains a purple juice in a vesicle on the neck.

E. With a long, straight, subulate closed beak, unarmed with spines. A very numerous subdivision. The following are the chief:

3. M. despectus. Beak dilated; shell oblong, striate, and somewhat rugged: whorls eight, with two elevated lines. Inhabits the seas of Europe, and often found on our own coasts; about five inches long: shell coarse, white, with a glossy orange-yellow aperture: the worm is sometimes eaten, but oftener used as a bait for cod and ray-fish.

4. M. tritonis. Musical murex. Shell ventricose, oblong, smooth, with rounded whorls, toothed aperture, and short beak: about fifteen inches long, white, and appearing as if covered with brown, yellow and black scales; pillar white, with transverse black striæ; whorls of the spire separated by a nodulous suture, the first marked with striate grooves.

Inhabits India and the South seas: a second variety the Mediterranean. This is the species used by the natives of New Zealand as a musical shell, and by the Africans and many nations of the east as a military horn.

F. Tapering, subulate, with a very short beak. The following is worth noticing:

5. M. minutissimus. Shell with five spirally striate whorls and remote ribs; beak closed. Inhabits the Welsh coast: the shell is very minute, elegant and pellucid.

MURIA, in mineralogy, a genus of the class salts. Of a salt taste, easily soluble in water, and the solution not made turbid by soda: not effervescing with diluted acids, but effervescing and emitting grey, ill-savoured, suffocating vapours in strong, hot, sulphuric acids: changing nitrous acid into nitro-muriatic acid. Nine species.

1. M. aquatica. Fixed, decrepitating when heated, of a cubic form, dissolved in water. Three varieties.

α. Held in solution in the waters of the ocean: sea-salt; the muria marina of Wall. and the Syst. Nat.; or sal marinum of Cronsted.

β. Held in solution in salt lakes, muria lacustris: sal marinum lacuum.

γ. Held in solution in salt springs. Spring-salt: the muria fountana of Waller and the Syst. Nat.; the sal fontanum of Cronsted.

Found in the ocean, salt lakes, &c.; and when evaporated generally contains from 20 to 30 per cent. of muriat of soda.

2. M. montana. Fossil muria. Common salt. Sal gem. Rock salt. Muriat of soda. Several varieties.

α. Crystallized in cubes.

β. Of a common form, sometimes fibrous, sometimes compact.

γ. In a stalactitical form.

Found in Britain, Poland, Hungary, Spain, and various other countries, sometimes forming vast masses and mountains: it is found colourless, and of various shades of grey, yellow, red, blue, or brown; frequently contaminated by a mixture of muriat of lime, muriat of magnesia, or other earths, and may be purified by dropping into it first a solution of carbonat of barytes, then of carbonat of soda, as long as any precipitate continues to fall; the precipitate should then be separated by filtration and evaporated slowly till the salt crystallizes: it is soluble in something less than three times its weight of water: spec. grav. 2,120: contains

Acid - - -	52
Soda - - -	42
Water of crystallization	6
	100 *Bergman.*

3. M. impura. Muriat of alumina. Earthy mineral muria. Fixed, decrepitating in the fire, dry, producing sulphat of soda when saturated with sulphuric acid, mixed with various earths. Found in the Nevil Holt waters and in the salt-pits of Salsburg, and is a coarser variety of the last from its being much mixed with gypsum, common mould, clay, and other earths; its taste is astringent.

4. M. febrifuga. Muriat of potash, or potass. Muriated tartarin. Salt of silvius. Fixed, decrepitating in the fire, forming muriat of potash with sulphuric acid. Found in the environs of Madrid, and some mineral waters in Normandy; has a disagreeable bitterish taste, and when dissolved and crystallized forms cubes which are often irregular; formerly known in the shops by the name of febrifuge or digestive salt: specific gravity 1,836: contains

Acid - - -	31
Potash - - -	61
Water - - -	8
	100 *Bergman.*

5. M. ammoniaca. Sal ammoniac. Muriat of ammonia. Of an acid pungent urinous taste, when heated subliming into a white smoke, rubbed with quick-lime exhaling an alkaline odour, its crystals deliquescing in the air. Two varieties.

α. Concrete in flowers or thin layers.

β. Concrete in small compact masses.

Found in coal-pits in various parts of Britain, but principally in the interior parts of Asia and Africa, and in the neighbourhood of volcanoes; rarely pure, white and transparent, generally of a yellowish-grey, apple-green, or brownish-black colour; it dissolves in about three times its weight of water, and when slowly evaporated forms flexible spicules connected like the web of a feather: spec. grav. 1,420: contains

Acid - - -	42,75
Ammonia - -	25,00
Water - -	32,25
	100,000 *Kirwan.*

6. M. barytes. Muriat of barytes. Muriated baryt. Fixed, decrepitating in the fire, of an acrid astringent taste, precipitating sulphat of baryt when dropped into a weak solution of suphuric acid. Found in some mineral waters of Sweden, and when evaporated forms four-sided prisms, whose bases are squares or tables: sometimes used in scrophulous affections in doses of from 5 to 20 drops; but much precaution is necessary in its exhibition, as, like all other barytic salts, it is poisonous: spec. grav. 28527: contains in a state of crystallization,

Acid - - -	20
Barytes - - -	64
Water - - -	16
	100

When dried contains,

Acid - - -	23,8
Barytes - -	76,2
	100 *Kirwan.*

7. M. strontiana. Muriat of strontian. Of a sharp penetrating taste, when heated undergoing a watry fusion and afterwards becoming a white powder, precipitated from its watry

solution by muriatic acid. Never perhaps found naturally combined, but prepared by dissolving carbonat of strontian in muriatic acid: spec. grav. 14,402: contains

Acid - - -	23,6
Strontian - -	36,4
Water - - -	40,0
	100 *Bergman.*

8. M. calcarea. Muriated calx. Muriated lime. Of a bitter taste, swelling and melting and losing its, water of crystallization in heat, and after having been exposed to a violent heat shining in the dark. Found in mineral waters, but generally combined with common sea-salt, to which it gives a bitterish taste, and which it causes to attract moisture, and melt speedily in the air; its crystals are six-sided striate prisms, terminated by very sharp pyramids; its earth is precipitated by sulphuric acid: specific gravity 1,76: contains

Acid - - -	31
Lime - - -	44
Water - - -	25
	100 *Bergman.*

9. M. magnesiata. Muriated magnesia. Muriat of magnesia. Found in salt and other mineral springs, and abounds in the waters of the sea; its solution precipitated by caustic alkalies, and not visibly by the sulphuric: it deliquesces very speedily in the air, and when dried in a high temperature is very caustic: specific gravity 1,601: contains

Acid - -	34
Magnesia - -	41
Water - - -	25
	100 *Bergman.*

MURIAS BARYTÆ. Terra ponderosa salita. In medicine. The muriate of barytes, or heavy earth, is a very acrid and poisonous preparation. In small doses it proves sudorific, diuretic, deobstruent, and alterative; in an overdose, emetic, and violently purgative. The late Dr. Crawford found it very serviceable in all diseases connected with scrophula; and the Germans have employed it with great success in some diseases of the skin and viscera, and obstinate ulcers. The dose of the saturated solution in distilled water, is from five to fifteen drops for children, and from fifteen to twenty for adults.

Murias calcis. Calx salita. Sal ammoniacus fixus. This preparation is exhibited with the same views as the muriate of barytes. It possesses deobstruent, diuretic, and cathartic virtues, and is much used by the celebrated Fourcroy against scrophula, and scrophulous diseases. Six, twelve, and twenty grains are given to children three times a day, and a drachm to adults.

Murias ferri. Ferrum salitum. Oleum martis per deliquium. This preparation of iron is styptic and tonic, and may be given in chlorosis, intermittents, rachitis, &c.

Murias ferri ammoniacalis. See Ferrum ammoniacale.

Murias hydrargyri. There are two simple muriates of mercury. See Calomelas, and Hydrargyrus muriatus mitis.

Murias hydrargyri ammoniacalis. See Calx hydrargyri alba.

Murias hydrargyri oxygenatus. See Hydrargyrus muriatus.

Murias hyperoxygenatus potassæ. The oxygenated muriate of potash has lately been extolled in the cure of the venereal disease. It is exhibited in doses of from fifteen to forty grains in the course of a day. It increases the action of the heart and arteries, oxygenates the blood, and proves of great service in scorbutus, asthenia, cachexia, &c.

Murias potassæ. Alkali vegetabile salitum. Sal digestivus. Sal febrifugus sylvii. This salt is exhibited with the same intention as the muriate of soda, and was formerly in high estimation in the cure of intermittents, &c.

Murias sodæ. Alkali minerale salitum. Sal commune. Sal culinaris. Sal fontium. Sal gemmæ. Sal marinus. Natron muriatum. Soda muriata. Common sea salt, possessing antiseptic, diuretic, and resolvent qualities, and frequently employed in form of clyster, fomentation, lotion, pediluvium, and bath, in obstipation, against worms, gangrene, scrophulous tumours, herpetic eruptions, arthritis, &c.

Murias stibii hyperoxygenatus. See Antimonium muriatum.

MURIATS. (*murias.*) Salts formed by the union of the muriatic acid with different bases; thus, muriat of ammoniac, muriat of copper, &c.

Muriat of alumina. See Muria.

Muriat of ammonia. See Muria.

Muriat of antimony. See Stibium.

Muriat of barytes. See Muria.

Muriat of copper. See Cuprum.

Muriat of lime. See Muria.

Muriat of magnesia. See Muria.

Muriat of mercury. See Hydrargyrum.

Muriat of potash. See Muria.

Muriat of silver. See Argentum.

Muriat of soda. See Muria.

Muriat of strontian. See Muria.

MURIATIC ACID. An acid obtained from muria or the basis of sea-salt by means of distillation with sulphuric acid. It is an invisible elastic fluid resembling air in its common properties. According to Mr. Davy's latest experiments, this is not a simple substance, though placed so in all our systematic treatises of chemistry, but a compound of a substance which has never yet been procured in an uncombined state, and of from a third to a fourth of water. See Phil. Trans. for 1809, p. 468.

Its use in the laboratory is very considerable; but in medicine and the arts it is but little employed except in the form of muriat, or combined with some salifiable base. It is worth remembering by the chemist that nothing takes off the crust of oxyd of iron, which in many experiments is found adhering with re-

markable closeness to glass vessels, so safely and so quickly as a little warm dilute muriatic acid.

This acid may be procured by the following process: Let a small pneumatic trough be procured, hollowed out of a single block of wood about 14 inches long, seven broad, and six deep. After it has been hollowed out to the depth of an inch, leave three inches by way of shelf on one side, and cut out the rest to the proper depth, giving the inside of the bottom a circular form. Two inches from each end cut a slit in the shelf to the depth of an inch, and broad enough to admit the end of small glass tubes, or the points of small retorts. This trough is to be filled with mercury to the height of one quarter of an inch above the surface of the shelf. Small glass jars are to be procured of considerable thickness and strength, and suitable to the size of the trough. One of them, being filled with mercury by plunging it into the trough, is to be placed on the shelf over one of the slits. It ought to be supported in its position; and the most convenient method of doing that is to have a brass cylinder two inches high screwed into the edge of the trough, just opposite to the border of the shelf. On the top of it are fixed two flat pieces of brass, terminating each in a semicircle, moveable freely upon the brass cylinder, and forming together a brass arm terminating in a circle, the centre of which is just above the middle of the slit in the shelf, when turned so as to be parallel to the edge of the shelf. This circle is made to embrace the jar: being formed of two distinct pieces, its size may be increased or diminished at pleasure; and by means of a brass slider it is made to catch the jar firmly.

The apparatus being thus disposed, two or three ounces of common salt are to be put into a small retort, and an equal quantity of sulphuric acid added; the beak of the retort plunged below the surface of the mercury in the trough, and the heat of a lamp applied to the salt in its bosom. A violent effervescence takes place; and air-bubbles rush in great numbers from its beak, and rise to the surface of the mercury in a visible white smoke, which has a peculiar odour. After allowing a number of them to escape, till it is supposed that the common air which previously existed in the retort has been displaced, plunge its beak into the slit in the shelf over which the glass jar has been placed. The air-bubbles soon displace the mercury and fill the jar. The gas thus obtained is called muriatic acid gas.

This substance, in a state of solution in water, was known even to the alchemists; but in a gaseous state it was first examined by Dr. Priestley, in an early part of that illustrious career in which he added so much to our knowledge of gaseous bodies.

1. Its specific gravity, according to the experiments of Mr. Kirwan, is 0,002315, or nearly double that of common air. Its smell is pungent and peculiar; and whenever it comes in contact with common air, it forms with it a visible white smoke. If a bottle of it is drawn into the mouth, it is found to taste excessively acid; much more so than vinegar.

2. Animals are incapable of breathing it, and when plunged into jars filled with it, they die instantaneously in convulsions. Neither will any combustible burn in it. It is remarkable, however, that it has a considerable effect upon the flame of combustible bodies; for if a burning taper is plunged into it, the flame, just before it goes out, may be observed to assume a green colour, and the same tinge appears next time the taper is lighted.

3. If a little water is let up into a jar filled with this gas, the whole gas disappears in an instant, the mercury ascends, fills the jar, and pushes the water to the very top. The reason of this is, that there exists a strong affinity between muriatic acid gas and water, and whenever they come in contact, they combine and form a liquid, or, which is the same thing, the water absorbs the gas. Hence the necessity of making experiments with this gas over mercury. In the water cistern not a particle of gas would be procured. Nay the water of the trough would rush into the retort and fill it completely. It is this affinity between muriatic acid gas and water which occasions the white smoke that appears when the gas is mixed with common air. It absorbs the vapour of water which always exists in common air. The solution of muriatic acid gas in water is usually denominated simply muriatic acid by chemists.

4. If a little of the blue-coloured liquid which is obtained by boiling red cabbage-leaves and water is let up into a jar filled with muriatic acid gas, the usual absorption of the gas takes place, but the liquid at the same time assumes a fine red colour. This change is considered by chemists as a characteristic property of acids.

5. Muriatic acid gas is capable of combining with oxygen. To obtain the combination, we have only to put a quantity of the black oxide of manganese in powder into a retort, and pour over it liquid muriatic acid. Heat is then to be applied to the mixture, and the beak of the retort plunged under water. An effervescence takes place, and a green-coloured gas comes out at the beak of the retort, which may be received in the usual manner in jars. This gas has been ascertained to be a compound of muriatic acid and oxygen. It is called oxymuriatic acid, and will come under our consideration hereafter.

6. It does not appear from any experiments that have been hitherto made, that any of the simple combustibles are capable of combining with muriatic acid gas. Dr. Priestley found, that sulphur absorbed slowly about the fifth part of it. What remained was inflammable air, burning with a blue flame, and not absorbed by water. He found that phosphorus scarcely absorbed any sensible quantity of it, and that charcoal absorbed it very fast. Hydrogen gas does not produce any sensible change in it. Neither does it seem capable of being affected by azotic gas.

Muriatic acid is capable of combining with

two doses of oxygen only. With the first dose, it forms oxymuriatic acid; with the second, hyperoxymuriatic acid. The first of them ought, in strict propriety, to be termed an oxide rather than an acid.

MURICATE. Muricated. In botany, punctis subulatis adspersus. Having subulate points scattered over; or armed with sharp prickles, like the murex shell-fish. Applied to the stem—to the calyx, as in crepis biennis—to the pod, as in bunias—to the seeds, as in caucalis, ammi. Hence we have

MURICATÆ for the name of the eleventh order in Linnéus's fragments of a natural method.

MURILLO (Bartholomew), a Spanish painter, born at Pilas, near Seville, in 1610, and died at Madrid in 1685. Though he painted historical pieces and landscapes, yet his favourite subjects were beggar boys in different actions and amusements. He was equal to Paul Veronese; and the king of Spain had so great an admiration of his talents, as to give him a patent of nobility.

MURK. *s.* (*morck*, Danish.) Darkness; want of light (*Shakspeare*).

MURK. *s.* Husks of fruit (*Ainsworth*).

MU'RKY. *a.* (*morck*, Danish.) Dark; cloudy; wanting light (*Addison*).

MU'RMUR. *s.* (*murmur*, Latin.) 1. A low shrill noise (*Pope*). 2. A complaint half suppressed (*Dryden*).

To MU'RMUR. *v. n.* (*murmuro*, Latin.) 1. To give a low shrill sound (*Pope*). 2. To grumble; to utter secret and sullen discontent (*Swift*).

MU'RMURER. *s.* (from *murmur*.) One who repines; a grumbler; a repiner (*Blackm.*).

MU'RNIVAL. *s.* Four cards of a sort.

MU'RRAIN. *s.* The plague in cattle (*Garth*).

MURRAY (William, earl of Mansfield), was fourth son of David, earl of Stormont, and born at Perth in 1705. He received his education at Westminster school, and was elected off for Christchurch in 1723. Here he took his degrees in arts, and then went abroad. On returning from his travels he became a member of Lincoln's-Inn, and in due course was called to the bar. He soon distinguished himself as an advocate, and in 1742 was appointed solicitor-general, and chosen into parliament for Boroughbridge. In 1754 he was made attorney-general, and in 1756 chief justice of the King's-Bench. He was soon after created baron of Mansfield. The year following he accepted the office of chancellor of the exchequer, which was done merely to effect a coalition of parties; and thereby an administration was formed, which carried the glory of the British arms to an unrivalled pitch. At the commencement of the present reign lord Mansfield was shamefully insulted in numerous libels, and in the affair of Mr. Wilkes he was exposed to the malicious attacks of party and faction. In 1776 he was created earl of Mansfield, with remainder to Louisa, viscountess Stormont, and her heirs male. In 1780, when the metropolis was a scene of lawless riot, his lordship's house in Bloomsbury-square was burnt down by the mob, and he escaped with difficulty. A vote of the house of commons was passed to make him a compensation for his loss, but he generously refused to accept of any reparation. In June, 1788, age and infirmities compelled him to resign his office, on which occasion he was addressed in a most respectful letter by the bar, which was transmitted to him by Mr. (now lord) Erskine. This great man died in 1793, and was buried in Westminster abbey. As he left no children, his earldom descended to his nephew lord Stormont.

MURRAY FRITH, a large bay of the German Sea, on the east coast of Scotland, and north of the county of Murray, whence its name.

MURRAY HARBOUR, a harbour on the east coast of the island of St. John, in the Gulf of St. Lawrence. Lon. 62. 20 W. Greenwich. Lat. 46. N.

MURRAY'S ISLANDS, several small islands on the south-west coast of the county of Kircudbright, at the mouth of Fleet bay: eleven or twelve miles N.N.E. Burrow Head.

MURRAYSHIRE, or ELGINSHIRE, a county of Scotland, bounded on the north by an arm of the sea, called the Frith of Murray, on the east by Banffshire, on the south by Aberdeenshire and Invernessshire, and on the west by Invernessshire and Nairnshire; being thirty miles from east to west, and nearly the same from north to south. Its air is salutary, and the winter milder than any other part in the north of the kingdom. The south side is mountainous, but abounds with pasture, as the low country does with corn. Here are several woods of firs and oaks. The soil is generally fruitful, and produces the fruits ripe soon. Its principal rivers are the Spey, the Lossie, Nairn, and Findhorn; all of which produce vast quantities of salmon. The chief towns are Elgin and Forres.

MURRAYA, in botany, a genus of the class decandria, order monogynia: calyx five-parted; corol five-petalled, campanulate; nectary surrounding the germ; berry one-seeded. One species only: an East Indian tree with alternate pinnate leaves.

MU'RREY. *a.* (*morée*, French.) Darkly red (*Boyle*).

MURRHINE, MURRHINUS, Μυῤῥινος, in antiquity, an appellation given to a delicate sort of ware brought from the east, whereof cups and vases were made, which added not a little to the splendor of the Roman banquets. Critics are divided concerning the matter of the pocula, or vasa murrhina, murrina, or murrea. Some will have them to have been the same with our porcelain or china-ware. The generality hold them to have been made of some precious kind of stone, which was found chiefly, as Pliny tells us, in Parthia, but more especially in Carmania. Arrian tells us, that there was a great quantity of them made at Diospolis in Egypt. This he calls another sort of murrhina work; and it is evident, from all accounts, that the murrhina of Diospolis was a sort of glass-ware, made in imitation of the porcelain or murrha of India.

There is some difference in the accounts given by Pliny and Martial of the murrhina vasa. The first author says, that they would not bear hot liquors, but that only cold ones were drank out of them. The latter, on the other hand, tells us, that they bore hot liquors very well. If we credit Pliny's account, their procelain was much inferior to ours in this particular. Some conjecture them to have been of agate, others of onyx, others of coral.

MU'RRION. *s.* (often written *morion.*) A helmet; a casque (*King*).

MURTH *of Corn. s.* Plenty of grain (*Ainsworth*).

MUS. Rat. In zoology, a genus of the class mammalia, order glires. Fore-teeth upper, wedged: grinders three, rarely two, on each side of each jaw; clavicle perfect. These animals live in holes or any concealed chinks, climb and run swiftly; seek their food by night, which is chiefly vegetable, and which they convey to the mouth by the fore-paws. The females have mostly eight teats, breed many times a year, bring numerous litters. Some of them migrate. The ears are short and rounded; fore-feet generally four-toed, with a warty excrescence instead of a fifth. Forty-six species scattered over the globe: six indigenous to our own country: they may be thus subdivided:

A. Tail compressed at the end.
B. Tail round, naked.
C. Tail round, hairy.
D. Cheeks pouched.
E. Earless; eyes small: tail short, or none; subterraneous.

The following are chiefly entitled to notice:

1. M. coypus. Beaver rat. Tail middle length, subcompressed, hairy: hind-feet palmate. Inhabits the waters of Chili: was first described by Molina; has a general resemblance to the other in size and colour, but in its teeth agrees with the rat tribe; is easily tamed. The female produces five or six young at a birth.

2. M. zibethicus. Musk rat. Tail long, compressed, lanceolate; feet cleft; anus with glands secreting a musky oily fluid. Inhabits the slow streams of North America, on the banks of which it builds, but more simply than the beaver: feeds on shell-fishes, in summer on fruit and herbs, in winter on roots, particularly of flags, and water-lilies. The female has six abdominal teats, and brings from three to six young, three or four times a year; swims and dives dextrously; walks unsteadily; a foot long.

3. M. pilorides. Musk cavy. Tail longish, scaly, truncate; body white. Another species tawny above. The first inhabits India; the second the West-Indies; burrows; infests houses; smells of musk; size of a rabbit; tail four inches long.

4. M. rattus. Black rat. Of a deep iron grey colour, nearly black. Belly cinereous; legs dusky, almost naked. Has a claw in the place of a fifth toe on the fore feet. Its body measures seven inches; its tail near eight. It inhabits most parts of Europe. Its numbers are much lessened, and in many places indeed extirpated, by the M. decumanus. This species is very destructive to corn, furniture, young poultry, rabbits, and pigeons. It will even gnaw the extremities of infants when asleep. It breeds often in a year, and brings six or seven young at a time. Makes its nest in a hole, often near a chimney, with wool, bits of cloth, or with straw. Will destroy and devour one another; but its greatest enemy is the weasel. It was carried into South America about the year 1544, by the Europeans, and is now become the pest of all that continent. The word rattus, or rat, is modern. The Romans probably comprehended all kinds under the word mus. The Welsh call it the French mouse, which intimates that it has been imported thence into our island. None of them are found in Siberia. They swarm at Otaheite, and others of the Society Islands, and are met with in New Zealand and New Holland. In Otaheite they are so bold as to attack the inhabitants when asleep, who hold them in the utmost detestation, and will not even kill them, lest they should be polluted by the touch. They will not even eat the bread-fruit these animals should happen to run over.

5. M. decumanus. Brown rat. Norway rat. This species is larger and stronger than the black. Its head, back, and sides, are of a light brown colour, mixed with tawny and ash-colour: its breast and belly of a dirty white: its feet are naked and of a dirty flesh colour: its fore feet are furnished with four toes, and a claw instead of a fifth. The length of its body is nine inches, of its tail the same. It weighs about eleven ounces. It inhabits most parts of Europe; but was a stranger to that continent till the present century. It came into Britain about sixty years ago. It has not been known in the neighbourhood of Paris above half that time. It is probable these animals were imported from the East-Indies, where they burrow, and undermine the foundations of houses so as to make them fall. They swarm in Petersburgh, and have reached Prussia; and sometimes migrate in vast armies, and do infinite mischief. They burrow like the water rat, on the sides of ponds and ditches, swim well, and dive readily: live on grain and fruits, and will destroy poultry and game. They breed prodigiously fast, as they bring from fourteen to eighteen young at a time. They are very bold and fierce. When closely pursued, will turn and fasten on the hand or stick that offers to strike them.

6. M. Americanus. American rat. Larger than the black, but less than the brown rat. Its upper jaw much longer than the lower: head long: nose narrow and pointed: ears large and naked; whiskers fine, but long: tail naked, and like that of the black rat, but not so long: colour a deep brown, inclining on the belly to ash. It inhabits North America. The mus caraco is nearly allied to this species. It burrows in the banks of rivers, and is supposed to extend from the lake Baikal to China, where it is very noxious.

7. M. amphibius. Water rat. Has a thick blunt nose; ears hid in its fur; small eyes, and yellow teeth: has five toes on each foot; the inner toe of the fore foot very small, and the first joint very flexible: head and body covered with long hair, black mixed with ferruginous: belly of an iron grey: tail covered with short black hair: lip whitish: its body measures seven inches; its tail five: it bears some resemblance to the beaver: the shape of its head and body is more compact than that of the former species. It inhabits Europe, the north of Asia, and North America. Those of Canada vary to tawny and white. It burrows in the banks of rivers, ponds, and ditches; feeds on small fish and fry, frogs, insects, and roots. It swims and dives admirably; but while it preys on so many other fishes, it becomes itself the prey of the pike. It brings six young at a time. This animal, and the otter, are eaten in France on meager days.

8. M. musculus. Mouse. This species needs no description. When found white, it is very beautiful; and its full bright eye appears to great advantage amidst its snowy fur. The mouse follows mankind, and inhabits all parts of the world, except the Arctic.

9. M. silvaticus. Field-mouse. Has full black eyes: its head, back, and sides, of a yellowish brown mixed with dusky hairs: breast of an ochre colour, and belly white: its body is four inches and a half long: tail is slightly covered with hair, and measures four inches. It inhabits Europe, and is found only in fields and gardens. It feeds on nuts, acorns, and corn, and forms great magazines of provisions for winter. It makes a nest for its young very near the surface; and often in a thick tuft of grass. It brings from seven to ten young ones at a time. In some parts of England it is called the bean mouse, from the havock it makes among beans when just sown. It is common in Russia about the Uralian Chain, but not beyond.

There is an American variety of it, some white, others black, with large, naked, and open ears, and a broad dark stripe along the back. Their cheeks and sides are orange coloured: the under side of their tails is of a snowy whiteness. Their feet are white; and their hind-legs are longer than those of the European kind.

10. '. messorius. Harvest-mouse. Its eyes less prominent than those of the former species. It has prominent ears; and is of a full ferruginous colour above; white beneath; with a straight line along the sides, dividing the colours. It is two inches and a half long; its tail measures two inches. The whole animal weighs only one-sixth of an ounce.

In Hampshire, they appear in great numbers during the harvest, but never enter the houses. They are often carried into the ricks of corn in the sheaves; and are often killed in hundreds at the breaking up of the ricks. During winter they shelter themselves under ground, and burrow very deep, where they form a warm bed of dead grass. They form their nests also above ground among standing corn; and bring about eight young at a time.

11. M. striatus. Oriental mouse. About half the size of the common mouse: of a grey colour, and has rounded ears. Its back and sides are elegantly marked with twelve rows of small pearl-coloured spots, extending from the head to the rump. Its tail is as long as its body. It inhabits India. In the same country, and in Guinea, there is another small species which smells of musk The Portuguese living in India call it cheroso, and say its bite is venomous.

12. M. Barbatus. Barbary mouse Less than the common mouse; of a brown colour; marked on the back with ten slender streaks. It has three toes, with claws on the fore-feet, and the rudiments of a thumb. Its tail is of the same length with the body.

13. M. Mexicanus. Mexican mouse. Of a whitish colour, mixed with red. Its head is whitish: each side of its belly is marked with a great reddish spot.

14. M. Virginianus. Virginian mouse. Pointed ears; a black pointed nose; and long whiskers. Fur very short: limbs very slender: tail very thick at the base, and all beset with long hair; tapers gradually to a point; and is very long and slender. The colour of this animal is universally white. The thickness at the base of its tail is its specific difference.

15. M. vagus. Wandering mouse. This species has an oblong head, a blunt nose, with a red tip, and yellow cutting teeth. Its eyes are placed midway between the nose and ears: its ears are large, oval, and naked; but dusky and downy at the tips: its limbs are slender: its tail is longer than the body, and very slender also; its colour above is pale ash, mixed and waved with black; with a black line along the back. The ends of its limbs are whitish. Its body and tail are each about three inches long. It inhabits the whole Tartarian desert. At certain times, they wander about in great flocks, migrating from place to place during the night. They are observed in birch woods as high as 57° north. Are of a very chilly nature, soon become torpid, and sleep rolled up in a cold night, even in the month of June. They live in holes and fissures of rocks.

16. M. betulus. Birch-mouse. The birch is still less than the wandering mouse. Like it, it is very tender, and soon grows torpid in cold weather. It inhabits the same countries, runs up trees, and fastens on the boughs with its tail. By the assistance of its slender fingers, it adheres to any smooth surface. It emits a weak note: has a sharp nose, red at the point, like that of the former; but smaller ears, brown and bristly at the points. Its tail is very slender, and much longer than its body; brown above, and white below. It has a dusky line also along the back.

17. M. agrarius. Rustic mouse. This has a sharp nose, an oblong head, small ears lined with fur. Its colour is ferruginous above, whitish beneath. Above each hind-foot, it has a dusky circle. It is of a less size than the field mouse. Its tail is only half the length of its body. It is found in the temperate parts of Russia; in villages and corn fields, and in the woods of Siberia. In Russia, it is called the corn mouse. At times they migrate in vast multitudes, and destroy the whole expectations of the farmer. In 1763 and 1764, this plague made great ravages in the rich country about Casan and Arsk. They came in such numbers, as to fill the very houses; and, through hunger, became so bold as to rob the tables of bread, before the faces of those who had sat down to eat it. At the approach of winter, they all disappeared.

They burrow, and form their retreats but little below the surface.

18. M minutus. Little mouse. The least of the genus, and weighs not half a dram. It accompanies M. agrarius in corn fields, barns, and birch woods. It is said there are more males than females of this species, and that they seem to wander without having any certain places for their nests. They have sharpish noses, and small ears, half hid in their fur, and are of a deep tawny colour above, white below, with grey feet.

19. M. saxatilis. Rock-mouse. About four inches long; tail one and a half, having a few hairs scattered over it. Head oblong: nose rather pointed: ears rise above the fur; and are oval and downy, with brown edges: whiskers short: limbs strong: colour brown, slightly mixed with grey above: belly of a light ash: snout dusky, with a very slender ring of white.

20. M. œconomus. Œconomic mouse. Small eyes: naked ears, hid in its fur; strong limbs; and very tawny teeth: colour black and yellow intimately mixed: has a dark down beneath the hair; the ends of its feet dusky: about four inches and

a quarter long: tail rather more than an inch. In the form of its body it resembles the meadow-mouse; but is rather longer, and has a bigger belly.

It inhabits all Siberia, especially its eastern parts, and Kamschatka, in great numbers. It is even found within the Arctic circle.

Professor Pallas gave these animals the name of œconomic mice, from their curious way of living. They inhabit damp soils, and shun the sandy, and form burrows with many chambers and entrances. In their chambers they lay up store of provisions, collected with great pains in summer from various plants, which they bring out of their holes in a sunny day that they may dry them more effectually. During summer they never break upon their hoards, but live on berries, and other vegetable productions. In certain years, they make great migrations out of Kamschatka. They collect in the spring, and go off in incredible multitudes. Like the lemmus, they proceed in a direct course, and neither rivers nor arms of the sea stop their progress. In their passage through the watery element, numbers of them fall a prey to ravenous fishes. But on land they are safe, for the people of Kamschatka have a superstitious veneration for them, and are so far from hurting them, that if they find any of them lying faint from fatigue or hunger, they give them all possible assistance. On their return from a migration, expresses are sent to all parts with the glad news. When the natives rob them, they never take away all their store, but leave them something to subsist on.

21. M. rutilus. Red mouse. About four inches long: its tail above one, and full of hair: its nose and face are very bristly: its back is of an uniform, pleasant, tawny red: its sides are light grey and yellow. The under side of the body whitish: feet also white: inhabits Siberia from the Oby eastward to Kamschatka, in woods and mountains. It is also found within the Arctic circle. They wander out the whole winter, and are very lively even amidst the snows. They eat any thing that comes in their way.

22. M. alliarius. Garlic mouse. Frequent in magazines of bulbous roots formed by the peasants of Siberia, especially in those of angular garlic. It has great open naked ears; its tail is clothed with hair. The colour of its back is cinereous, mixed with long hairs, tipped with a dusky grey: its sides are of a light ash: its breast, belly, and feet, are white: its body is four inches; its tail one and a half.

23. M. soricinus. Shrew-like or soricene mouse. Found in the neighbourhood of Strasbourg, of a yellowish grey on the upper parts of the body, with a white belly: nose a little extended: has four toes before, five behind, round ears, a tail of a middling length, and covered with hair.

24. M. lemmus. Lemmus, or leming. Has two very long cutting teeth in each jaw, a pointed head, and long whiskers. Its eyes are small and black: its mouth small: upper lip divided; ears small and blunt, reclining backwards: fore-legs very short, with four slender toes on each, covered with hair; and in place of a thumb, it has a short claw, like a cock's spur: has five toes behind: skin very thin: head and body black and tawny, disposed in irregular blotches: belly white, tinged with yellow: length about five inches: tail one and a half. Those of Russian Lapland are much less than those of the Norwegian or Swedish. They appear in numberless troops, at very uncertain periods, in Norway and Lapland, and are at once the pest and wonder of the country. They march like the army of locusts, so emphatically described by the prophet Joel, destroy every root of grass before them, and spread universal desolation. They infect the very ground; and cattle are said to perish which taste the grass they have touched. They march by myriads in regular lines. Nothing stops their progress; neither morass nor lake, water nor fire: the greatest rock is but a slight obstacle; they wind round it, and then go on straight. If they meet a peasant, they jump as high as his knees in defence of their progress. They are so fierce, that they will lay hold of a stick, and suffer themselves to be swung about before they quit their hold: if struck, they turn and bite, and make a noise like a dog.

They feed on grass, on the rein-deer liverwort, and the catkins of the dwarf birch. The first they get under the snow, beneath which they wander during winter. Where they make their lodgements, they have a spiracle to the surface for the sake of air. In these retreats they are eagerly pursued by the Arctic foxes.

They make also very shallow burrows under the turf; but do not form any magazines for winter provision: by this improvidence, it seems they are compelled to migrate, urged by hunger to quit their usual residence.

They breed often in the year, and bring five or six young at a time. Sometimes they bring forth on their march, during a migration: some they carry in their mouths, and others on their backs. They are not poisonous. The Laplanders often eat them, and compare their flesh to that of squirrels.

They are the prey of foxes, lynxes and ermines, who follow them in great numbers. They perish at length, either from want of food, or from their destroying each other, or in some great water, or in the sea. In former times, the priests exorcised them in a long set form of prayer. They migrate once or twice in twenty years, like a vast colony of emigrants from a country overstocked; a discharge of animals from the great northern hive, that once poured out its myriads of human creatures upon southern Europe. Where the head quarters of these quadrupeds are, is not certainly known: it was once seriously believed, that they were generated in the clouds, and that they fell in showers upon the earth; but wherever they come from, none return: their course is predestinate, and they pursue their fate.

25. M. torquatus. Ringed rat. This has a blunt nose; ears hid in its fur; legs strong and short; soles covered with hair; claws very strong, and hooked at the end, and very fine hair all over the body; of a ferruginous colour, mixed with yellow; sometimes pale grey, clouded, or waved with a dusky rust colour. From the ears, down each side of the head, there is a dusky space; and behind that, a stripe of white, so that the neck appears to be encircled with a collar; behind which there is another dusky one. The body is three inches long; the tail one. At its end there is a tuft of hard bristles. It inhabits the northern parts about the Oby; burrows with many passages beneath the turfy soil; and lines its nest with rein-deer and snow liverwort. They are said to migrate at the same seasons with the lemmus.

26. M. Hudsonius. Hudson's Bay rat. This has slender brown whiskers; very fine long soft

hair; ash, tinged with tawny, on the back, with a dusky stripe running along its middle; and along each side a pale tawny line. Its belly is of a pale ash colour: its limbs very short; fore-feet very strong. The two middle claws of the male are very strong, thick, and compressed at the end. Tail very short, terminated by some stiff bristles. Body about five inches long. It inhabits Labrador.

27. M. lagurus. Hair-tailed rat. This species has a long head, and a blunt nose; lips rough and swelling out; and ears short, round and flat: tail extremely short, scarcely appearing out of the hair: its fur is very soft and full, ash mixed with dusky, with a dark line along its back: its body is between three and four inches long. It inhabits the country about the Yaik, the Irtish, and the Jenesey. They love a firm dry soil, burrow, and make two entrances, the one oblique, the other perpendicular.

The males fight for the females, and devour each other. They are very salacious. When in heat, emit a musky smell. The females bring six at a time. Like the marmots, they are slow in their motions, and sleep rolled up like them. They are very fond of dwarf iris; but feed on all sorts of seeds. They also migrate in great troops; and the Tartars call them the rambling mouse.

28. M. socialis. Social mouse. This has a thick head; a blunt nose; naked oval ear; short strong limbs; and a slender tail. The upper part of the body of a light grey, palest on the sides: the shoulders and belly white: the body above three inches: the tail one and a half. It inhabits the Caspian desert, and the country of Hyrcania. They live in low sandy grassy places, in great societies. Their burrows are about a span deep, with eight or more passages. They are always found either in pairs, or with a family. They rarely appear in autumn; but swarm in the spring: are said to migrate, or change their place in autumn, or to conceal themselves among the bushes; and in winter to shelter themselves in hay-ricks. They breed later than the other kinds; feed much on tuli proots; and are the prey of weasels, crows, and vipers.

29. M. arvalis. Meadow mouse. Has a large head; a blunt nose; short ears hid in its fur; prominent eyes; and a short tail. The head and body ferruginous, mixed with black: belly, a deep ash colour: feet dusky: six inches long: tail one and a half, covered with hair, and tufted. It inhabits Europe. It is also found in great abundance in Newfoundland, where it does much mischief in the gardens. In England, it makes its nest in moist meadows; brings eight young at a time, and has a very great affection for them. It resides under ground, and lives on nuts, acorns, and corn.

30. M. gregalis. Gregarious mouse. Has a small mouth and blunt nose; ears naked, and appear above the fur: hair on the upper-part of its body black at the roots and tips, ferruginous in the middle; throat, belly, and feet, whitish; tail, which is one third of the length of its body, covered with thin white hairs.

It is a little larger than the common mouse, inhabits Germany and Sweden, eats sitting up, burrows and lives under ground.

31. M. cricetus. Hamster rat. This species has large rounded ears, and full black eyes; it is of a reddish brown, with red cheeks, a white spot beneath, and another behind each, and a fourth near the hind legs; its breast, the upper part of its fore-legs, and its belly black; tail short and almost naked; has four toes and a fifth claw on the fore feet, five behind; about nine inches long, tail three. The males are always bigger than the females. Some males weigh from twelve to sixteen ounces; the females seldom exceed six. They vary sometimes in colour. A family of them is frequently found about Casan entirely black. They inhabit Austria, Silesia, Poland, and the Ukraine; and as far to the east as the Jenesey. They are fond of a sandy soil abounding in liquorice, and feed on its seeds. They are very destructive to grain, eating great quantities, and carrying off still more to hoard it: on such occasions, they fill their cheek pouches, which will contain the fourth of an English pint, so full that they seem ready to burst. They live under ground, and form their burrows obliquely; at the end of the passage, the male sinks one perpendicular hole, the female several: at the end of these are formed various vaults, either as lodgings for themselves and their young, or as storehouses for their food; each young one has its different apartment, each sort of grain its different vault. Their lodgings are lined with straw or grass. Their vaults are of different depths, according to the age of the animal. A young hamster digs scarcely one foot deep: an old one four or five. The diameter of the habitation of a family, with all its communications, is from eight to ten feet. The male and female have always separate apartments; for, excepting their short season of courtship, they have no intercourse. The whole race is so malevolent, that they constantly reject all society with one another.—They will fight, kill, and devour their own species. The female brings forth two or three times in a year, from sixteen to eighteen at a birth. Their growth is very quick. At the age of three weeks, the old one forces them out, and obliges them to shift for themselves. She shews little affection for them at any time; even when they are young, in case of danger, she attemps to burrow deeper to save herself, but entirely neglects her brood: on the contrary, if attacked in the time of courtship, she defends the male with the utmost fury.

They lie torpid from the first cold to the end of winter; and during that time are seemingly quite insensible, and have the appearance of being dead. Their limbs are stiff, and their bodies cold as ice: not even spirits of wine, or oil of vitriol, poured into them, can produce the least mark of sensibility. It is only in places beyond the reach of the air that they become torpid; for the severest cold on the surface does not affect them.

The hamster, in its annual revival, begins first to lose the stiffness of its limbs, then breathes deeply, and by long intervals: on moving its limbs, it opens its mouth, and makes a rattle in its throat. It is not till after some days that it opens its eyes and attemps to stand; but even then it makes its efforts like a person very much in liquor. At length, when it has attained its usual attitude, it rests for a long time in tranquillity, seemingly to recollect itself, and recover from its fatigue.

They begin to lay in provisions of corn, peas, and beans, in August. As soon as they have finished their work, they stop up the mouth of their passage carefully. In winter the peasants go on what they call a hamster nesting; and, when they discover a horde, dig down till they reach it, and are commonly well paid; for, besides the skins of the animals, which are valuable furs, they find commonly two bushels of good grain in the magazine.

These animals are very fierce; they will jump at a horse if he happen to tread near them, and will hang by his nose in such a manner that it is difficult to disengage them. They make a noise like the barking of a dog. In some seasons so numerous as to occasion a dearth of corn, and on that account are proscribed. In Gotha, in one year, eighty thousand and upwards of their skins were presented at the Hotel de Ville. But polecats are their greatest enemies, for they pursue them into their holes and destroy numbers. It is remarkable, that the hair sticks so close to the skin as not to be plucked off but with the utmost difficulty.

32. M. accedula. Yaik rat. This species has a thick snout, a blunt nose, and very fleshy lips; upper lip is divided; upper fore-teeth small, yellow, convex, and truncated; lower slender and pointed; eyes large; ears naked, and stand up high above its fur; tail is short and cylindrical; face is white; body, four inches long; is of a cinereous yellow, mixed with brown above, below of a hoary whiteness. It inhabits the deserts about the Yaik, quits its burrow, and runs about during the night.

33. M. phaeus. Zarizyn rat. Forehead much elevated; the edges of its eye-lids black; ears naked and oval, standing far out of the fur; it is of a hoary ash colour, with dusky hairs above; sides whitish; the under side of the body, and the extremities of its limbs, of a snowy whiteness; about three inches and a half long, and inhabits the deserts of Astracan and the Hyrcanian mountains. About the Persian villages in Hyrcania, it commits great ravages among the rice. It does not grow torpid during the winter.

34. M. arenarius. Sand rat. Nose sharp; very large pouches, great oval brown ears, white nails, and a short hoary body: its sides, belly, limbs, and tail, of a pure white: four inches long; tail above one: inhabits and burrows in the sandy plains near the river Irtish.

35. M. songarius. Songar rat. Of a grey colour; has a thick head and a blunt nose; ears oval, very thin, and lightly covered with a hoary down; tail short, blunt, thick, and hairy. A black line runs along its back: its sides are spotted with white: its belly and legs are white. They are found in the same country with the sand rat. Dr. Pallas kept some of them a great while. They grew familiar; would feed from his hand, lap milk; and, when placed on a table, shewed no desire of running away. They were slower in all their motions than the other species; washed their faces with their paws, and sat up to eat; wandered about during the day, and slept all night rolled up. They seldom made any cry; and, when they did, it was like that of a bat.

36. M. furunculus. Baraba rat. About three inches and a quarter long, has a sharp nose, large broad naked ears of a dusky colour, edged with white. It is of a cinereous yellow above, below of a dirty white. A black line extends from the neck to near the tail: the tail, near one inch long, is white, marked with a dusky line. They inhabit the sandy plain of Baraba, towards the Oby; and about the lake Dalai in the Chinese empire.

37. M. typhlus. Blind mole rat. This has a great head, broader than the body, and not the least aperture for eyes; yet beneath the skin are found what may be called the rudiments of those organs, though not larger than the seed of a poppy. Has no external ears: the end of its nose covered with a thick skin; nostrils remote, and placed below; mouth gapes, and the teeth are exposed; those above short; the lower ones very long, and their ends quite uneven: body cylindrical; limbs short; has five toes on each foot, with short claws: hair short, thick, and soft; dusky at the bottom, grey above, white about the mouth and nose. Between seven and eight inches long. A male will weigh above eight ounces. It inhabits the southern parts of Russia, from Poland to the Wolga. It delights in moist and turfy soils. The earth it throws up in hillocks of two yards in circumference. It works with great agility. On any apprehension of an enemy, it forms instantly a perpendicular burrow. Its bite is very severe. When irritated, it snorts and gnashes its teeth, but emits no cry. It often quits its hole, especially in the morning, and during the amorous season, along with the female, to bask in the sun. In Ukraine, the vulgar believe that the touch of a hand, which has suffocated this animal, will cure the kind's-evil.

38. M. aspalax. Daurian rat. This species has a thick flat head, a short snout, and a blunt nose. Its upper fore-teeth are naked; a moveable lip covers the lower: it has no external ears; its eyes very small, yet visible; body short and depressed; limbs very strong, especially the fore-legs; tail short, hair soft and loose, of a greyish colour. They measure from six to nine inches; inhabit the Arctic mountains, and beyond lake Baikal; burrow a little below the surface; have a voice weak and plaintive. The Russians call it the earth bear.

39. M. maritimus. African rat. This has a large head, a black nose, flat and corrugated; eyes minute, and much hid in the fur; no ears; tail about two inches long, compressed and covered above and below with short hair, and edged with bristles, disposed horizontally. Is of a cinereous brown, palest on the lower parts, and about thirteen inches long. Inhabits the sandy country near the Cape of Good Hope; burrows, and makes the ground so hollow as to be very inconvenient for travellers; for it breaks every six or seven minutes under the horse's feet, and lets them in up to the shoulders. It grows to the size of a rabbit, and is, by some, esteemed a good dish.

40. M. capensis. Cape rat. About seven inches long, and very destructive to the gardens about the Cape. Its tail is very short, beset with bristles. Though the rest of its nose is white, yet the end of it is naked and black. Its head, cheeks, back, and sides, are of a rusty brown; but it has a white space round its eyes and ears.

41. M. talpinus. Talpine rat. About four inches long, has a large short head, and a thick truncated snout. Upper teeth long and flat, extending out of its mouth: eyes small, hid in its fur; ears bounded by a small rim; tail scarce appears without the fur; upper parts dusky; chin, belly, and limbs, whitish. It inhabits the open grounds of the temperate parts of Russia and Siberia: loves a black turfy soil, and is frequent in meadows near villages. Its manners resemble those of the mole. These rats do not become torpid in the winter; but make their nest deep in the ground, and keep themselves warm by lining it with soft grass. They are very easily taken, but soon grow sick in confinement, unless a quantity of earth is put into the place where they are kept. They are in heat in the end of March or beginning of April; the females have then a strong musky smell: they bring three or

four at a time. They vary in colour; some are found quite black. See Nat. Hist. Pl. CLVIII.

MUSA, in botany, a genus of the class polygamia, order monœcia. Herm. Spathe partial, many-flowered; corol two-petalled; one of them erect, five-toothed; the other nectariferous, concave and shorter; stamens six; style one. Male above: five filaments, perfect; germ inferior, abortive. Fem. one filament, perfect; berry inferior, oblong, three-sided, many-seeded. Three species, as follow:

1. M. paradisiaca. Plaintain-tree. Spadix nodding; males permanent. It grows spontaneously in many parts of India, but has been immemorially cultivated by the Indians in every part of the continent of South America. It is an herbaceous tree, growing to the height of fifteen or twenty feet. The pomes are nearly of the size and shape of ordinary cucumbers, and when ripe of a pale yellow colour, of a mealy substance, a little clammy, a sweetish taste, and will dissolve in the mouth without chewing. The whole spike of fruit often weighs forty or fifty pounds. When they are brought to table by way of desert, they are either raw, fried, or roasted; but if intended for bread, they are cut before they are ripe, and are then either roasted or boiled. The trees being tall and slender, the Indians cut them down to get at the fruit; and in doing this they suffer no loss, for the stems are only one year's growth, and would die if not cut; but the roots continue, and new stems soon spring up, which in a year produce ripe fruit also. From the ripe plaintains they make a liquor called mistaw. When they make this, they roast the pomes in their husks, and after totally beating them to a mash, they pour water upon them, and as the liquor is wanted it is drawn off. But the nature of this fruit is such, that it will not keep long without running into a state of putrefaction; and therefore, in order to reap the advantage of it at all times, they make cakes of the pulp, and dry them over a slow fire, and as they stand in need of mistaw, they mash the cakes in water, and they answer all the purposes of fresh fruit. These cakes are exceedingly convenient to make this liquor in their journeys, and they never fail to carry them for that purpose. The leaves of the tree being large and spacious, serve the Indians for table-cloths and napkins. These leaves are nevertheless thin and tender; so that when they are exposed to the open air they are generally torn by the wind; for in consequence of their extent, the wind has the greater power against them. They are deeply seated in their origin, and seem to proceed from the very center of the stalk; they at first appear to be rolled up, but as they advance above the stalk they expand and turn backward.

In Jamaica this tree is so largely cultivated, and found so truly useful, that according to some writers the island could not subsist without it.

Wheaten flower is said to be less palatable and even less wholesome to the laborious negro than the food afforded by this plant. It also serves to fatten horses, oxen, swine, dogs, poultry, and other domestic animals.

2. M. sapientum. Banana tree. Spadix nodding; males deciduous. Stalks marked with dark purple stripes or spots; fruit shorter and rounder, with a softer pulp of a still more delicious taste. It is never eaten green; but is very agreeable when ripe; is extremely agreeable, and relished by all ranks of people, either eaten raw, or fried in slices or fritters. It is supposed to be a native of Guinea, and carried thence to the West India islands, where it flourishes most abundantly. It is also cultivated in Egypt and in other hot countries, where it grows to perfection in about ten months from first planting to the ripening of the fruit. When the stalks are cut down several suckers rise from the roots, which in six or eight months produce fruit; so that by cutting down the stalks at different times, a constant succession of fruit may be obtained through the whole year.

They may be made to grow in our own hot-houses when they are very large, but it is not often that we meet with sufficient space for their accommodation. They may be propagated by suckers that shoot from the roots of plants that have fruited. The fruit is about four or five inches long, of the form of the cucumber. The leaves are two yards long, and a foot broad in the middle; they join to the top of the body of the tree, and often contain in their cavities a great quantity of water, which runs out upon a small incision being made into the tree, at the junction of the leaves. The weight of a bunch of bananas usually exceeds 12lb. The trunk of the tree is peculiarly porous; the roots alone are perennial, the rest dying down to the ground every autumn.

3. M. troglodytarum. Spadix erect; spathe deciduous. The spathe and berry are both scarlet, but the latter is not eatable. It is a native of the Molucca Islands.

MUSÆUS, an ancient Greek poet, was, according to Plato and Diodorus Siculus, an Athenian, the son of Orpheus, and chief of the Eleusinian mysteries instituted at Athens in honour of Ceres: or, according to others, he was only the disciple of Orpheus: but from the great resemblance which there was between his character and talents and those of his master, by giving a stronger outline to the figure he was called his son, as those were styled the children of Apollo who cultivated the arts of which he was the tutelar god.

Musæus is allowed to have been one of the first poets who versified the oracles. He is placed in the Arundelian marbles, epoch 15. 1426 B. C. at which time his hymns are there said to have been received in the celebration of the Eleusinian mysteries. Laertius tells us, that Musæus not only composed a theogony, but formed a sphere for the use of his companions; yet as this honour is generally given to Chiron, it is more natural to suppose, with sir Isaac Newton, that he enlarged it with the addition of several constellations after the conquest of the golden fleece. The sphere itself

shows that it was delineated after the Argonautic expedition, which is described in the asterisms, together with several other more ancient histories of the Greeks, and without any thing later; for the ship Argo was the first long vessel which they had built: hitherto they had used round ships of burthen, and kept within sight of the shore; but now, by the dictates of the oracle, and consent of the princes of Greece, the flower of that country sail rapidly through the deep, and guide their ship by the stars.

Musæus is celebrated by Virgil in the character of hierophant, or priest of Ceres, at the head of the most illustrious mortals who have merited a place in Elysium. Here he is made the conductor of Æneas to the recess where he meets the shade of his father Anchises.

A hill near the citadel of Athens was called Musæum, according to Pausanias, from Musæus, who used to retire thither to meditate and compose his religious hymns; at which place he was afterwards buried. The works which went under his name, like those of Orpheus, were by many attributed to Onomacritus. Nothing remains of this poet now, nor were any of his writings extant in the time of Pausanias, except a hymn to Ceres, which he made for the Lycomides.

MUSARS. The name given to certain itinerant musicians who performed on the musette, and were formerly very numerous in most countries of Europe. See MUSETTE.

MUSCA. Fly. In zoology, a genus of the class insecta, order diptera. Mouth with a soft exserted fleshy proboscis, and two equal lips; sucker furnished with bristles; two very short feelers or none; antennas generally short. Five hundred and twenty known species scattered over the globe, of which a hundred are common to our own country. They may be thus subdivided.

A. With two short feelers.

α. Sucker with a single bristle without sheath; antennas short, clavate, furnished with a lateral line: the hair of the antennas in the greater number feathered; in the rest naked. This section embraces nearly two thirds of the entire genus.

β. Sucker with a single bristle, without sheath: antennas pointed and united at the base. This section constitutes the stratiomys of Fabricius.

γ. Sucker with a single bristle and univalve sheath; antennas seated on a common petiole. It constitutes the ceria of Fabricius, and embraces only a single species: it inhabits Kiel and Barbary.

δ. Sucker with three bristles, without sheath; feelers placed at the base of the sucker. The rhagis tribe of Fabricius.

ε. Sucker with three bristles and a single-valved sheath; antennas united at the base and pointed at the tip. The bibio tribe of Fabricius.

ζ. Sucker with four bristles, without sheath; feelers placed at the base of the bristle. The antennas of some of these are feathered, but of the greater number naked. It is a numerous tribe, and forms the syrphus of Fabricius.

B. Feelerless.

α. Sucker with a single recurved bristle without sheath; antennas inserted at the base of the proboscis. This tribe forms the nemotilus of Fabricius, and includes only seven species.

β. Sucker with a single bristle without sheath; antennas approximate, with an ovate compressed club. It includes only four species, and forms the mydas of Fabricius.

It is probable that the known species bear no comparison to the unknown. Mr. Harris, in his English entomology, describes a greater number of species than Linnéus enumerated as existing in the world: yet England is far from being a country most productive of this insect. The south of Europe affords a much greater variety of species than the north; and all hot climates than cold. In hot climates, indeed, they multiply to a degree almost intolerable, and are incalculably mischievous both to animal and vegetable foods.

The different species are extremely diversified in their external form, their structure, their organization, their metamorphosis, their manner of propagating their species, and in providing for their posterity. A full explanation of these different parts of their economy would require a large volume, and would constitute a narrative to many readers not uninteresting. Such an undertaking, however, is incompatible with the limits prescribed to our work.

Some of these insects have trunks instead of a mouth; others have that organ armed with teeth; and many have both a mouth and a trunk. The proboscis of flies is a machine contrived for pumping the blood from the vessels of large animals, and the nectar from the petals of flowers; and the science of hydraulics has not enabled men to construct machines more complicated, more exactly arranged, or better adapted to these purposes. Some of them possess considerable firmness and solidity, those especially that are destined to pierce the skins of cattle. In order to see them at work, all that is necessary is to expose a syrup to attract them, and to take up a lens for their inspection.

Each eye of the fly contains in it an assemblage of a great number of small ones, which according to Reaumur has the effect of multiplying the surrounding objects, and creating representations of them, which the experience of the insect corrects. From the eye, if you pass along and survey the body, you find it provided with the organs of respiration. Four small stigmata, for this purpose, are found upon the thorax, and a greater number dispersed over the annuli of the abdomen. The covering of the different parts of the abdomen are scaly, and do not consist all of one piece, but admit of the contraction and dilatation of that part, according to the circumstances of

the animal. Each of the feet terminates in a small bunch of setæ resembling a brush.

The interior organization of this genus, when examined with a proper apparatus, presents two pulmonary sacs of a white colour, arranged longitudinally along the body. As the bodies of some species are diaphanous, the action of the heart may also be discerned, as well as the liquor it contains, continually driven along the great artery leading to it, and returning by the same course. During their larve state, flies in general go through a greater variety of metamorphoses than even the silk or butterfly worms: in their progress from the vermicular to the chrysalis state, they pass through an intermediate change, unexperienced by other insects. From the shortness of their lives, all these vicissitudes must rapidly succeed each other: this circumstance, however, does not prevent many species from constructing a cocoon for their last metamorphosis, of a curious fabric. The greater part of these cocoons are of silk, with a mixture of other materials; those, indeed, most common with us serve themselves with their own skin, which becomes an incrustated covering to protect them during their dormant and aurelia state.

When the different members have acquired sufficient firmness, the fly is ready to burst from its shell in its winged form. The covering of the chrysalis, especially of those that are metamorphosed in their own skin, would seem to prove, by its hardness, an effectual bar to that event. About the time, however, of its change, the head of the fly is capable of being swollen and dilated in an unusual manner; and it is by means of this dilatation that the fly bursts its covering, and opens a passage for its escape.

The food of flies is as various as their different kinds; some being supported wholly by vegetable substances, while others are carnivorous; and among the latter there are some that only devour flesh in a state of putrefaction. Dung, and vegetables in a similar state, are the favourite meals of others.

The female flies are all fecundated by copulation; an act in which the most incurious observer must have frequently seen them engaged. The observations of Reaumur seem to prove, that the females of some kinds take that part in the act of fecundation which is usually performed by the male in other animals; and that it is her extremity which penetrates into the body of the male. The far greater part of insects are oviparous; some, however, belonging to this genus bring forth living young: but what appears most unaccountable is, that some apparently of the same species are viviparous, while the rest lay eggs; a circumstance that shews the futility of our attempts to arrange them. Many of the viviparous flies possess a degree of fecundity that must appear altogether incredible to those who have not been versant in the study of insects. Some of them have been found to contain in their body no less than twenty thousand living animals at one time. We shall notice a few species.

1. M. domestica. House fly. The thorax of this species is brown, having upon it four occult dark lines; the abdomen is of an orange brown, with a few spots of black. This fly seldom makes its appearance before the month of July.

2. M. vespæ similis. Wasp fly. Entirely resembles the animal whose name it bears: the head is lemon coloured; the antennas brown; the thorax and abdomen black, the latter marked with transverse bands of yellow.

3. M. pellucens. Transparent fly. Thorax black, partially covered with a few brown hairs, and having the point sometimes yellow: abdomen with black beneath, white above; transparent both below and above.

4. M. carnaria. Flesh fly. Hairy, black; thorax with paler lines; abdomen shining, tesselate. Inhabits Europe on putrid meat, on which it deposits its whitish, oblong eggs most readily, though often likewise on fresh meat. The larves or maggots hatch in the space of a few hours, become full grown in eight or ten days, and are then of a whitish or yellowish-white colour with a slight tinge of pale red, shape long, with a sharpened front in which the mouth is situated, and whence the body gradually enlarges in size to the last or terminal segment, which is of a broad and flattened form, surrounded by several slightly prominent tips, and furnished with a pair of dusky specks resembling eyes: so that an inaccurate spectator may easily mistake this part for the head, and the proper head for the tail. When the larve changes to a chrysalis the skin dries around it, and the whole assumes a completely oval form, and a reddish colour. In ten days more the fly itself emerges and becomes perfect.

5. M. flava. Yellow, with bright gold-green eyes. One of the smallest but most elegant of the European tribes.

6. M. vomitoria. Blow-fly Thorax black; abdomen shining, blue; front fulvous.

This is also a fly that frequents putrid meat, and deposits a larve of a similar appearance, and hatched in the same manner as that of M. carnaria.

7. M. chamæleon. Scutel two-toothed, yellow; abdomen black, with three triangular yellow spots on each side, and one at the end. Inhabits England and Europe generally near fresh waters; the front of the male yellow, of the female cinereous. The eggs are deposited in the hollow stalks of aquatic plants or broken reeds. The larve has twelve annular divisions, its tail a circular fringe of hairs, which when expanded support it on the surface of the water with the head downwards.

MU'SCADEL. MUSCADINE. *a.* (*muscal, muscadel*, Fr. *moscatello*, Ital.) A kind of sweet grape, sweet wine, and sweet pear.

MUSCHENBROECK (Peter de), a very distinguished natural philosopher and mathematician, was born at Utrecht a little

before 1700. He was first professor of these in his own university, and afterwards invited to the chair at Leyden, where he died full of reputation and honours in 1761. He was a member of several academies; particularly the academy of sciences at Paris. He was the author of several works in latin, all of which show the greatest penetration and exactness in this way. He was also very consummate in the knowledge of law. His Elements of Natural Philosophy were translated into the English language by Professor Colson of Cambridge, and published in 1744, in two volumes 8vo.

MUSCI. Mosses. The third of the families, and the seventh of the nations or casts, into which Linnéus has distributed all vegetables.—The sixty-fifth order in his Fragments; and the fifty-sixth of his Ordines Naturales.—They form the second order of the class cryptogamia, in his artificial system.

Hedwig has made considerable discoveries with respect to the fructification of mosses.

MUSCICAPA. Fly-catcher. In zoology, a genus of the class aves, order passeres. Bill nearly triangular, notched on each side, bent in at the tip, and beset with bristles at the root: toes (mostly) divided to their origin. Ninety-six species, scattered over the warmer tracts of the globe, two only common to our own country: the greater number inhabitants of Australasia and Polynesia. Among ourselves the fly-catcher is a bird of passage that breeds in the island, but retires as early as the month of August. It builds its nest upon the sides of trees, or of old walls, and feeds upon insects. When the young are led out, they generally take their station upon the higher boughs of trees, whence they are taught to drop perpendicularly upon the flies below, and to rise again in the same manner. Subordinate to the rapacious birds, and in the next class, nature has placed this tribe of hunters, more numerous than that of its superiors, because more useful. The largest of this genus is of the size of the butcher bird, while the smallest is not larger than the nightingale. All the intermediate degrees are occupied by various kinds, differing in magnitude, but marked by the same generic characters.

The following are the species mostly worthy of notice.

1. M. aëdon. Rusty-brown, beneath yellowish white; middle tail-feathers subequal, the outermost on each side much shorter. Inhabits Dauria: size of turdus arundinaceus; and sings delightfully during the night.

2. M. grisola. Spotted fly-catcher. Brownish, beneath whitish; neck longitudinally spotted; vent pale rufous, back mouse-colour; wings and tail black, the former edged with white; chin spotted with red; legs black. Inhabits England and Europe at large: five and a half inches long; appears in England in the spring, and retires in August; builds in holes of walls or hollow trees; is fond of cherries; eggs pale, spotted with reddish.

3. M. rubicollis. Purple-throated fly-catcher. Black; chin and throat with a large purple-red spot. Inhabits the woods of South America; twelve inches long; is gregarious; feeds on fruits and insects, and often associates with the toucan.

4. M. flabellifera. Fan-tailed fly-catcher. Above olive, beneath ferruginous; eyebrows, chin, throat, sides of the neck, and lateral tail-feathers white; middle tail feathers, head, and collar black; bill black. Inhabits New Zealand; six and a half inches long; flies with its tail expanded like a fan; is easily tamed, and will sit on the shoulders and pick off flies as they appear.

5. M. Carolinensis. Cat fly-catcher. Brown, beneath cinereous: head black, vent red; bill and crown black; tail e[illegible]n, blackish. Inhabits Virginia: eight inches long; mews like a cat.

MUSCLE. *Musculus*. In anatomy, the parts that are usually included under this name consist of distinct portions of flesh, susceptible of contraction and relaxation; the motions of which, in a natural and healthy state, are subject to the will, and for this reason they are called voluntary muscles. Besides these, there are other parts of the body that owe their power of contraction to their muscular fibres, independently of the will: thus the heart is a muscular texture, forming what is called a hollow muscle; and the urinary bladder, stomach, intestines, &c. are enabled to act upon their contents, merely because they are provided with muscular fibres; these are called involuntary muscles, because their motions are not dependent on the will. The muscles of respiration being in some measure influenced by the will, are said to have a mixed motion. The names by which the voluntary muscles are distinguished are founded on their size, figure, situation, use, or the arrangement of their fibres, or their origin and insertion; but besides these particular distinctions, there are certain general ones that require to be noticed. Thus, if the fibres of a muscle are placed parallel to each other, in a straight direction, they form what anatomists term a rectilinear muscle; if the fibres cross and intersect each other, they constitute a compound muscle; when the fibres are disposed in the manner of rays, a radiated muscle; and when they are placed obliquely with respect to the tendon, like the plume of a pen, a penniform muscle. Muscles that act in opposition to each other are called antagonists; thus every extensor has a flexor for its antagonist, and *vice versa*. Muscles that concur in the same action are termed congeneres. The muscles being attached to the bones, the latter may be considered as levers, that are moved in different directions by the contraction of those organs. That end of the muscle which adheres to the most fixed part is usually called the origin; and that which adheres to the more moveable part the insertion of the muscle. In almost every muscle two kinds of fibres are distinguished; the one soft, of a red colour, sensible, and irritable, called fleshy fibres, see MUSCULAR FIBRES; the other of a firmer texture, of a white glistening colour, insensible, without irritability or the power of contracting, and named tendinous fibres. They are occasionally intermixed, but the fleshy fibres generally prevail in the

belly, or middle part of the muscle, and the tendinous ones in the extremities. If these tendinous fibres are formed into a round slender cord, they form what is called the tendon of the muscle; on the other hand, if they are spread into a broad flat surface, it is termed an aponeurosis.

Each muscle is surrounded by a very thin and delicate covering of cellular membrane, which incloses as it were like a sheath, and dipping down into its substance, surrounds the most minute fibres we are able to trace, connecting them to each other, lubricating them by means of the fat which its cells contain in more or less quantity in different subjects, and serving as a support to the blood-vessels, lymphatics, and nerves, which are so plentifully distributed through the muscles.—This cellular membrane, which in no respect differs from that is found investing and connecting the other parts of the body, has been sometimes mistaken for a membrane peculiar to the muscles; and hence we often find writers giving it the name of membrana propria musculosa. The muscles owe the red colour which so particularly distinguishes their belly part to an infinite number of arteries, which are every where dispersed through the whole of their reticular substance; for their fibres, after having been macerated in water, are, (like all other parts of the body divested of their blood), found to be of a white colour. These arteries usually enter the muscles by several considerable branches, and ramify so minutely through their substance, that we are unable, even with the best microscopes, to trace their ultimate branches. Ruysch fancied that the muscular fibre was hollow, and a production of a capillary artery; but this was merely conjectural. The veins, for the most part, accompany the arteries, but are found to be larger and more numerous. The lymphatics, likewise, are numerous, as might be expected from the great proportion of reticular substance, which is every where found investigating the muscular fibres. The nerves are distributed in such abundance to every muscle, that the muscles of the thumb alone are supplied with a greater proportion of nervous influence than the largest viscera, as the liver for instance. They enter the generality of muscles by several trunks, the branches of which, like those of the blood-vessels, are so minutely dispersed through the cellular substance, that their number and minuteness soon elude the eye and the knife of the anatomist. This has given rise to a conjecture, as groundless as all the other conjectures on this subject, that the muscular fibre is ultimately nervous.

Table of the Muscles.—The generality of anatomical writers have arranged muscles according to their several uses; but this method is evidently defective, as the same muscle may very often have different and opposite uses. The method here adopted is that more usually followed; they are enumerated in the order in which they are situated, beginning with those that are placed nearest the integuments, and proceeding from these arranged in successive order from the head to the feet, those not in pairs being distinguished by the mark *.

Muscles of the integuments of the cranium:

Occipito frontalis *. Corrugator supercilii.

Muscles of the eye-lids:

Orbicularis palpebrarum. Levator palpebræ superioris.

Muscles of the eye-ball:

Rectus superior. Rectus inferior. Rectus internus. Rectus externus. Obliquus superior. Obliquus inferior.

Muscles of the nose and mouth:

Levator palpebræ superioris alæque nasi. Levator labii superioris propius. Levator anguli oris. Zygomaticus major. Zygomaticus minor. Buccinator. Depressor anguli oris. Depressor labii inferioris. Orbicularis oris *. Depressor labii superioris alæque nasi. Constrictor nasi. Levator menti vel labii inferioris.

Muscles of the external ear:

Superior auris. Anterior auris. Posterior auris. Helicis major. Helicis minor. Tragicus. Antitragicus. Transversus auris.

Muscles of the internal ear:

Laxator tympani. Membrana tympani. Tensor tympani. Stapedius.

Muscles of the lower jaw:

Temporalis. Masseter. Pterygoideus externus. Pterygoideus internus.

Muscles about the anterior part of the neck:

Platysma myoides. Sterno-cleido-mastoideus.

Muscles between the lower jaw and os hyoides:

Digastricus. Mylo-hyoideus. Genio-hyoideus. Genio-glossus. Hyo-glossus. Lingualis.

Muscles situated between the os hyoides and trunk:

Sterno-hyoideus. Crico-hyoideus. Sterno-thyroideus. Thyreo-hyoideus. Crico-thyroideus.

Muscles between the lower jaw and os hyoides laterally:

Stylo-glossus. Stylo-hyoideus. Stylo-pharyngeus. Circumflexus. Levator palati mollis.

Muscles about the entry of the fauces:

Constrictor isthmi faucium. Palato-pharyngeus. Azygos uvulæ*.

Muscles situated on the posterior part of the pharynx:

Constrictor pharyngis superior. Constrictor pharyngis medius. Constrictor pharyngis inferior.

Muscles situated about the glottis:

Crico-arytænoideus posticus. Crico-arytænoideus lateralis. Thyreo-arytænoideus. Arytænoideus obliquus*. Arytænoideus transversus*. Thyreo-epiglottideus. Arytæno-epiglottideus.

Muscles situated about the anterior part of the abdomen:

Obliquus descendens externus. Obliquus ascendens internus. Transversalis abdominis. Rectus abdominis. Pyramidalis.

Muscles about the male organs of generation:

Cremaster. Erector penis. Accelerator urinæ. Transversus perinei.

Muscles of the anus:

Sphincter ani *. Levator ani *.

Muscles of the female organs of generation:

Erector clitoridis. Sphincter vaginæ *.

Muscles situated within the pelvis:

Obturator internus. Coccygeus.

Muscles situated within the cavity of the abdomen:

Diaphragma *. Quadratus lumborum. Psoas parvus. Psoas magnus. Iliacus internus.

Muscles situated on the anterior part of the thorax:

Pectoralis major. Subclavius. Pectoralis minor. Serratus major anticus.

Muscles situated between the ribs, and within the thorax:

Intercostales externi. Intercostales interni. Triangularis.

Muscles situated on the anterior part of the neck, close to the vertebræ:

Longus colli. Rectus internus capitis major. Rectus capitis internus minor. Rectus capitis lateralis.

Muscles situated on the posterior part of the trunk:

Trapezius. Latissimus dorsi. Serratus posticus inferior. Rhomboideus. Splenius. Serratus superior posticus. Spinalis dorsi. Levatores costarum. Sacro-lumbalis. Longissimus dorsi. Complexus. Trachelo-mastoideus. Levator scapulæ. Semi-spinalis dorsi. Multifidus spinæ. Semi-spinalis colli. Transversalis colli. Rectus capitis posticus minor. Obliquus capitis superior. Obliquus capitis in ferior. Scalenus. Interspinales. Intertransversales.

Muscles of the superior extremities:

Supra-spinatus. Infra spinatus. Teres minor. Teres major. Deltoides. Coraco-brachialis. Subscapularis.

Muscles situated on the os humeri:

Biceps flexor cubiti. Brachialis internus. Biceps extensor cubiti. Anconeus.

Muscles situated on the fore arm:

Supinator radii longus. Extensor carpi radialis longior. Extensor carpi radialis brevior. Extensor digitorum communis. Extensor minimi digiti. Extensor carpi ulnaris. Flexor carpi ulnaris. Palmaris longus. Flexor carpi radialis. Pronator radii teres. Supinator radii brevis. Extensor ossis metacarpi pollicis manus. Extensor primi internodii. Extensor secundi internodii. Indicator. Flexor digitorum sublimis. Flexor digitorum profundus. Flexor longus pollicis. Pronator radii quadratus.

Muscles situated chiefly on the hand:

Lumbricales. Flexor brevis pollicis manus. Adductor pollicis manus. Abductor indicis manus. Opponens pollicis. Abductor pollicis manus. Palmaris brevis. Abductor minimi digiti manus. Adductor minimi digiti. Flexor parvus minimi digiti. Interossei interni. Interossei externi.

Muscles of the inferior extremities:

Pectinalis. Triceps adductor femoris. Obturator externus. Gluteus maximus. Gluteus minimus. Glutens medius. Pyriformis. Gemini. Quadratus femoris.

Muscles situated on the thigh:

Tensor vaginæ femoris. Sartorius. Rectus femoris. Vastus externus. Vastus internus. Cruralis. Semi-tendinosus. Semi-membranosus. Biceps flexor cruris. Popliteus.

Muscles situated on the leg:

Gastrocnemius externus. Gastrocnemius internus. Plantaris. Tibialis anticus. Tibialis posticus. Peroneus longus. Peroneus brevis. Extensor longus digitorum pedis. Extensor proprius pollicis pedis. Flexor longus digitorum pedis. Flexor longus pollicis pedis.

Muscles chiefly situated on the foot:

Extensor brevis digitorum pedis. Flexor brevis digitorum pedis. Lumbricales pedis. Flexor brevis pollicis pedis. Abductor pollicis pedis. Adductor pollicis pedis. Abductor minimi digiti pedis. Flexor brevis minimi digiti pedis. Transversales pedis. Interossei pedis externi. Interossei pedis interni.

For their origins, insertions, and uses, see ANATOMY.

MUSCLE, in zoology. See MYTILUS.

MUSCO'SITY. *s.* (*muscosus*, Lat.) Mossiness.

MUSCOVY. See RUSSIA.

MUSCOVY GLASS. See MICA.

MU'SCULAR. *a.* (from *musculus*, Lat.) Relating to muscles; performed by muscles.

MUSCULAR FIBRE, that part of the body of an animal which, in common language is known by the name of flesh, and constitutes a considerable portion of the food of man, and of various other mammalian tribes: for the chemical properties of which see, the article FLESH.

The fibres that compose the body of a muscle are arranged in fascicles or bundles, which are easily distinguishable by the naked eye; but these fascicles are divisible into still smaller ones; and these again are probably subdivisible almost *ad infinitum*. The most minute fibre we are able to trace, seems to be somewhat plaited: these plaits disappearing when the fibre is put upon the stretch, appear evidently to be the effect of contraction, and have probably induced some writers to assert, that the muscular fibre is twisted or spiral. Various have been the opinions concerning the structure of these fibres; they are all of them founded only on conjecture, and therefore we shall mention only the principal ones, and this with a view rather to gratify the curiosity of the reader, than to afford him information. Borelli supposes them to be so many hollow cylinders, filled with a spongy medullary substance, which he compares to the pith of elder, *spongiosa ad instar sambuci.* These cylinders, he contends, are intersected by circular fibres, which form a chain of very minute bladders. This hypothesis has since been adopted by a great number of writers, with certain variations. Thus, for instance, Borelli supposes the vesicles to be of a rhomboidal shape; whereas Bernouilli contends that they are oval. Cowper went so far as to persuade himself that he had filled these cells with mercury; a mistake, no doubt, which arose from its insinuating itself into some of the lymphatics. It is observable, however, that Leeuwenhoeck says nothing of any such vesicles. Here, as well as in many other of her works, nature seems to have drawn a boundary to our inquiries, beyond which no human penetration will probably ever extend. It is surely more commendable, however, to acknowledge our ignorance, than to indulge ourselves in chimæra.

MUSCULAR MOTION. Muscular motions are of three kinds; namely, voluntary, involuntary, and mixed. The voluntary motions of muscles are such as proceed from an immediate exertion of the active powers of the will: thus, the mind directs the arm to be raised or depressed, the knee to be bent, the tongue to move, &c. The involuntary motions of muscles are those which are performed by organs, seemingly of their own accord, without any attention of the mind, or consciousness of its active power: as the contraction and dilatation of the heart, arteries, veins, absorbents, stomach, intestines, &c. The mixed motions are those which are in part under the controul of the will, but which ordinarily act without our being conscious of their acting; as is perceived in the muscles of respiration, the intercostals, the abdominal muscles, and the diaphragm.

When a muscle acts, it becomes shorter and thicker; both its origin and insertion are drawn towards its middle. The sphincter muscles are always in action; and so likewise

are antagonist muscles, even when they seem at rest. When two antagonist muscles move with equal force, the part which they are designed to move remains at rest; but if one of the antagonist muscles remains at rest; while the other acts, the part is moved towards the centre of motion.

All the muscles of living animals are constantly endeavouring to shorten themselves.

When a muscle is divided it contracts. If a muscle be stretched to a certain extent, it contracts, and endeavours to acquire its former dimensions, as soon as the stretching cause is removed: this takes place in the dead body; in muscles cut out of the body, and also in parts not muscular, and is called by the immortal Haller *vis mortua*, and by some *vis elastica*. It is greater in living than in dead bodies, and is called the tone of the muscles.

When a muscle is wounded, touched, or otherwise irritated, it contracts independent of the will: this power is called irritability, and by Haller *vis insita*; it is a property among animals peculiar to and inherent in the muscles. The parts of our body which possess this property are called irritable, as the heart, arteries, proper muscles, &c. to distinguish them from those parts which have no muscular fibres. With regard to the degree of this property peculiar to various parts, the heart is the most irritable, then the stomach and intestines; the diaphragm, the arteries, veins, absorbents, and at length the various proper muscles follow; but the degree of irritability depends upon the age, sex, temperament, mode of living, climate, state of health, idiosyncrasy, and likewise upon the nature of the stimulus.

When a muscle is stimulated, either through the medium of the will or any foreign body, it contracts, and its contraction is greater or less in proportion as the stimulus applied is greater or less. The contraction of muscles is different according to the purpose to be served by their contraction: thus, the heart contracts with a jerk; the urinary bladder, slowly and uniformly; puncture a muscle, and its fibres vibrate; and the abdominal muscles act slowly in expelling the contents of the rectum. Relaxation generally succeeds the contraction of muscles, and alternates with it.

The use of this property is very considerable; for upon it depends all muscular motion, and the function of every viscus, except that of the nerves.

Upon the various theories that have been advanced to explain the cause of muscular power or irritability we have dwelt at some length in the article IRRITABILITY; and to that we refer the reader on the present occasion. We have only to add that in a very elaborate paper on the function of the heart and arteries, written by Dr. Young, and inserted, as the Croonian lecture, in the Philosophical Transactions for 1809, this acute reasoner has attempted to establish in a considerable degree the circulation of the blood upon the general laws of hydraulics, and to prove that in the ordinary circulation the fibres of the muscular tunic of the arteries have very little effect in propelling the blood, their use being almost limited to accommodating the blood-vessels to their contents, by altering the capacity of the canal.

MUSCULA'RITY. *s.* (from *muscular.*) The state of having muscles (*Grew*).

MU'SCULOUS. *a.* (*musculosus*, Lat.) 1. Full of muscles; brawny. 2. Pertaining to a muscle (*More*).

MUSCULUS. (*musculus*, of *mus*, a mouse, from its resemblance to a flead mouse.) See MUSCLE.

MUSCULUS CUTANEUS. See PLATYSMA MYOIDES.

MUSCULUS PATIENTIÆ See LEVATOR SCAPULÆ.

MUSCULUS TUBÆ NOVÆ. See CIRCUMFLEXUS.

MUSCUS ARBOREUS. This plant, lichen plicatus of Linnéus, we are informed by that great botanist, is applied by the Laplanders to parts which are excoriated by a long journey. It is slightly adstringent, and is applied with that intention to bleeding vessels.

MUSCUS CANINUS. See LICHEN CINEREUS TERRESTRIS.

MUSCUS CLAVATUS. See LYCOPODIUM.

MUSCUS CRANII HUMANI. See USNEA.

MUSCUS CUMATILIS. This cryptogamious plant, lichen apthosus, is said to act powerfully on the intestines, though never used in the practice of the present day.

MUSCUS ERECTUS. Upright club moss. The pharmacopœial name of the lycopodium selago of Linnéus. The decoction of this plant acts violently as a vomit and a purgative, and was formerly on that account employed to produce abortions.

MUSCUS ISLANDICUS. See LICHEN ISLANDICUS.

MUSCUS MARITIMUS. See CORALLINUS.

MUSCUS PULMONARIUS QUERCINUS. See PULMONARIA ARBOREA.

MUSCUS PYXIDATUS. Cup moss. These very common little plants, lichen cocciferus, and pyxidatus of Linnéus, for both are used indifferently, are employed by the common people in this country in the cure of hooping cough.

To MUSE. *v. n.* (*muser*, French.) 1. To ponder; to think close; to study in silence (*Hooker*). 2. To be absent of mind; to be attentive to something not present (*Shakspeare*). 3. To wonder; to be amazed (*Shakspeare*).

MUSEIA, were Grecian festivals in honour of the muses, celebrated with games every fifth year, particularly by the Thespians. The Macedonians also observed a festival of the same name in honour of Jupiter and the muses, which lasted for nine days, and was celebrated with stage plays, songs, and poetical compositions.

MUSES, certain fabulous deities among the pagans, supposed to preside over the arts and sciences: for this reason it is usual for the poets, at the beginning of a poem, to invoke these goddesses to their aid. The muses were originally only singers and musicians in the service of Osiris, or the great Egyptian Bac-

chus, under the instruction and guidance of his son Orus; but in succeeding times they were called the daughters of Jupiter and Mnemosyne or Memory.

These are the only pagan divinities whose worship has been continued through all succeeding changes in the religion and sentiments of mankind. Professors of every liberal art in all the countries of Europe still revere them; particularly the poets, who seldom undertake the slightest work without invoking their aid.

Sir Isaac Newton tells us, that the singing women of Osiris were celebrated in Thrace by the name of the muses; and that the daughters of Pierius, a Thracian, imitating them, were celebrated by the same name.

Diodorus Siculus informs us, that Alcman of Messene, a lyric poet who flourished in the 27th Olympiad, 670 years B. C. makes them the daughters of Uranus and Terra. It has been asserted by some ancient writers, that at first they were only three in number; but Homer, Hesiod, and other profound mythologists, admit of nine.

In his hymn to Apollo, Homer says,

—— By turns the nine delight to sing.

They were generally supposed to be the daughters of Jupiter and Mnemosyne, and were nine in number, Clio, Euterpe, Thalia, Melpomene, Terpsichore, Erato, Polyhymnia, Calliope, and Urania. They have been severally called Castalides, Piarides, Aganippides, Lebethrides, Aonides, Heliconiades, &c. from the places where they were worshipped, or over which they presided. Apollo, their patron and conductor, has received the name of Musagetes, or leader of the muses. The palm tree, the laurel, and all the fountains of Pindus, Helicon, Parnassus, &c. were sacred to the muses. They were generally represented as young, beautiful, and modest virgins, and commonly appeared in different attire according to the arts and sciences over which they presided. See Clio, Euterpe, &c. Their contest with the daughters of Pierus is well known. See Pierides. The worship of the muses was universally established, particularly in the enlightened parts of Greece, Thessaly, and Italy. No sacrifices were ever offered to them, though no poets ever began a poem without a solemn invocation to the goddess who presided over verse.

The following passage translated from Callimachus, expresses the attributes of the muses in as many lines:

Calliope the deeds of heroes sings;
Great Clio sweeps to history the strings;
Euterpe teaches mimes their silent show;
Melpomene presides o'er scenes of woe;
Terpsichore the flute's soft power displays;
And Erato gives hymns the gods to praise;
Polymnia's skill inspires melodious strains;
Urania wise, the starry course explains;
And gay Thalia's glass points out where folly reigns.

MUSE'FUL. *a.* (from *muse.*) Deep thinking; silently thoughtful (*Dryden*).

MU'SER. *s.* (from *muse.*) One who muses; one apt to be absent of mind.

MU'SET. *s.* (In hunting.) The place through which the hare goes to relief (*Bailey*).

MUSEUM, a name which originally signified a part of the palace of Alexandria, which took up at least one-fourth of the city. This quarter was called the museum, on account of its being set apart for the muses and the study of the sciences. See Musæus. Here were lodged and entertained the men of learning; who were divided into many companies or colleges, according to the sciences of which they were the professors; and to each of these houses or colleges was allotted a handsome revenue. The foundation of this establishment is attributed to Ptolemy Philadelphus, who here placed his library. Hence the word museum is now applied to any place set apart as a repository for things that have an immediate relation to the arts.

The museum at Oxford, called the Ashmolean museum, is a noble pile of building erected at the expence of the university, at the west end of the theatre, at which side it has a magnificent portal, sustained by pillars of the Corinthian order. The front, which is to the street, extends about 60 feet, where there is this inscription over the entrance in gilt characters, *Museum Ashmoleanum, schola naturalis historiæ, officina* begun in 1679, and finished in 1683, when a valuable collection of curiosities was presented to the university by Elias Ashmole, Esq. which were the same day reposited there: several accessions have been since made to the museum; among which are hieroglyphics, and other Egyptian antiquities, an entire mummy, Roman antiquities, altars, medals, lamps, &c. and a variety of natural curiosities.

Museum (British), the museum of the late sir Hans Sloane, containing a great variety of the productions of nature and art, was purchased by the public at 20,000l. for the national use, and deposited in Montagu-house; where it may be rendered of no less general benefit to trade, than to the advancement of natural knowledge and experimental philosophy.

For the purchase of this museum, as well as the Harleian collection of manuscripts, and the Cottonian library, an act of parliament passed in the twenty-sixth year of George II. which incorporates the trustees into a body politic, with a common seal, and empowers them to manage the concerns of this museum.

In this act it is ordered that sir Hans Sloane's collection, the Cottonian library, the Harleian manuscripts, and a large collection of books given by major Edwards, should be placed together in the general repository. 7000l. were also given by major Edwards for the purchasing manuscripts, books, medals, &c.; and in 1772, parliament purchased sir William Hamilton's collection of Greek, Roman, and Etruscan antiquities, and placed them here. And every part is now so excellently contrived for holding this noble collection, and the disposition of it, in the several rooms, is so orderly

and well designed, that the British museum may be justly esteemed an honour and ornament to the nation. To this collection his majesty has been pleased to add the royal library of books, collected by the several kings of England; and several recent additions make this museum one of the most interesting objects to either the virtuoso or the man of literature which can well be imagined.

MUSGRAVE (Dr. William), a learned physician and antiquary, was born at Charlton-Musgrave in Somersetshire, about the year 1657; and studied at New-college, Oxford. Having distinguished himself by his knowledge in his profession, and his skill in natural philosophy, he was elected fellow of the Royal Society; and being made secretary in 1684, he continued the Philosophical Transactions from No. 167 to No. 178 inclusive. After having taken his degrees in physic, and being admitted a fellow of the college of physicians, he went and settled at Exeter, where he practised physic with great reputation and success. Being a man of extensive learning, he composed, at his leisure-hours, several curious and valuable works; as, 1. De arthritide anomala sive interna dissertatio. 2. De arthritide symptomatica dissertatio. 3. Julii Vitalis epitaphium, cum commentario. 4. De legionibus epistola. 5. De aquilis Romanis epistola. 6. Inscriptio Terraconensis, cum commentario. 7. Geta Britannicus, &c. 8. Belgium Britannicum. This learned physician died in 1721.

MUSHROOM, in botany. See AGARICUS and LYNCURIUS. To try the quality of mushrooms:—Take an onion, and strip the outer skin, and boil it with the mushrooms: if the onion become blue or black, there are certainly dangerous ones amongst them; if it remain white, they are good.

MUSIC, is both an art and a science, and in either case its object is the combining of sounds in a manner that shall be agreeable to the ear. This combination may be either simultaneous or successive: in the first case, it constitutes harmony; in the last, melody. But though the same sounds, or intervals of sound, which give pleasure when heard in succession, will not always produce the same effect in harmony; yet the principles which constitute the simpler and more perfect kinds of harmony are almost, if not entirely, the same with those of melody. By perfect harmony, we do not here mean that plenitude, those complex modifications of harmonic sounds which are admired in practice; but that harmony which is called perfect by theoricians and artists; that harmony which results from the coalescence of simultaneous sounds produced by vibrations in the proportions of thirds, fifths, and octaves, or their duplicates.

The principles upon which these various combinations of sound are founded, and by which they are regulated, constitute a science, which is not only extensive but profound, when we would investigate the principles from whence these happy modifications of sound result, and by which they are determined; or when we would explore the sensations, whether mental or corporeal, with which they affect us. When we consider with how easy a transition we may pass from the accents of speaking to diatonic sounds, when we observe how early children adapt the language of their amusements to measure and melody however rude, when we consider how early and universally these practices take place, there is no avoiding the conclusion, that the idea of music is connatural to man, and implied in the original principles of his constitution. The principles on which it is founded, and the rules by which it is conducted, constitute a science. The same maxims when applied to practice form an art: hence its first and most capital division is into speculative and practical music.

Speculative music is, if we may be permitted to use the expression, the knowledge of the nature and use of those materials which compose it; or, in other words, of all the different relations between the high and low, between the harsh and the sweet, between the swift and the slow, between the strong and the weak, of which sounds are susceptible; relations which, comprehending all the possible combinations of music and sounds, seem likewise to comprehend all the causes of the impressions which their succession can make upon the ear and upon the soul.

Practical music is the art of applying and reducing to practice those principles which result from the theory of agreeable sounds, whether simultaneous or successive; or, in other words, the conducting and arranging sounds according to the proportions resulting from consonance, from duration and succession, in such a manner as to produce upon the ear the effect which the composer intends. This is the art which we call composition. With respect to the actual production of sounds by voices or instruments, which is called execution, this department is merely mechanical and operative; which, only presupposing the powers of sounding the intervals true, of exactly proportioning their degrees of duration, of elevating or depressing sounds according to these gradations which are prescribed by the tone, and to the value required by the time, demands no other knowledge than a familiar acquaintance with the characters used in music, and a habit of expressing them with promptitude and facility.

Speculative music is likewise divided into two departments; viz. the knowledge of the proportions of sounds or their intervals, and that of their relative durations; that is to say, of measure and of time.

The first is what among the ancients seems to have been called harmonical music. It shews in what the nature of air or melody consists; and discovers what is consonant or discordant, agreeable or disagreeable, in the modulation. It discovers, in a word, the effects which sounds produce in the ear by their nature, by their force, and by their intervals; which is equally applicable to their consonance and their succession.

The second has been called rhythmical, because it treats of sounds with regard to their time and quantity. It contains the explication of their continuance, of their proportions, of their measures whether long or short, quick or slow, of the different modes of time and the parts into which they are divided, that to these a succession of sounds may be conformed.

Practical music is likewise divided into two departments, which correspond to the two preceding.

That which answers to harmonical music, and which the ancients called *melopée*, teaches the rules for combining and varying the intervals, whether consonant or dissonant, in an agreeable and harmonious manner.

The second, which answers to the rhythmical music, and which they called *rhythmopée*, contains the rules for applying the different modes of time, for understanding the feet by which verses were scanned, and the diversities of measure; in a word, for the practice of the rhythmus.

Music is at present divided more simply into melody and harmony; for since the introduction of harmony, the proportion between the [illegible]th and shortness of sounds, or even that be[illegible]n the distance of returning cadences, are of less consequence amongst us. For it often happens in modern languages, that the verses assume their measures from the musical air, and almost entirely lose the small share of proportion and quantity which in themselves they possess.

By melody the successions of sound are regulated in such a manner as to produce pleasing airs. See MELODY.

Harmony consists in uniting to each of the sounds, in a regular succession, two or more different sounds, which simultaneously striking the ear sooth it by their concurrence. See HARMONY, and the following treatise.

The ancient history of music, even among the most cultivated nations, is now either so entirely lost or so extremely obscured, that we can give no satisfactory account of it. All therefore which can be expected from this preliminary view, is a short and cursory detail of its primary state, and its most important revolutions, so far as history will enable us to accomplish this design.

It has been pretended by father Kircher and others, that music prevailed in Egypt before it was known in Greece. These authors derive its name from a word which is primitive in the Egyptian language, and attribute the invention of the art to the stridulous murmur of the winds whistling through reeds, or other vegetable tubes, which grew upon the banks of the river Nile. But if this idle and legendary account of the discovery merits any attention at all, it must relate to instrumental music alone: for it cannot be imagined that mankind, if in the least degree attentive to the natural modulation of their own voices, and to such transitions of sound as were agreeable or disagreeable, would have recourse for their ideas of melody to objects so extrinsic and so contingent as the whistling of winds through a reed. Man is certainly as much a musical as he is a vocal animal; nor is the act of singing in him less instinctive than in birds, though his powers are more extensive and more susceptible of culture than theirs. If we believe the accounts of such as have been attentive to the music of the groves, they will tell us, that though the feathered warblers have a musical instinct, yet the modes of its exertion are as really acquired by birds from their parents or tutors as by men. Nor is it easy to conceive a human creature, endowed with the natural powers of musical sensation, and advanced to any degree of maturity, without supposing at the same time that he has tried several musical experiments, and that in some degree he has formed and cultivated his natural organs.

The origin of instrumental music appears to have been at a period much prior to the date of authentic history; and when we look for its epoch or its discoverer, we are carried at once into the wild regions of fable and mythology. The god Mercury, or Hermes, is said to be the inventor of the lyre, by distending strings of different tensions and diameters upon the shell of a tortoise which [illegible] found upon the shore. The first exhibition of the fistula, or shepherd's pipe, is ascribed to Pan. But of these beings and their actions little or nothing can be ascertained with proper evidence. We must therefore content ourselves with such later accounts as merit any degree of confidence.

The Grecian lyre, in its original state, seems to have been an instrument of the utmost simplicity: for, according to some, the Mercurian lyre consisted only of three, and according to others only of four strings. These being touched open, could only produce the same number of sounds: from whence we may easily conclude, that the powers of this instrument could not be very extensive. This tetrachord, as some say, was conjoined; others maintain that it was disjoined, and that its intervals were not even diatonic. It is, however, allowed, that its two extremes produced an octave; and that the two intermediate strings divided it by a fourth on each side, with a tone in the midst, in the following manner:

Ut,————Trite diezengménon.
Sol,————Lichanos méson.
Fa,————Parhypate méson.
Ut,————Parhypate hypaton.

This is what Boëtius calls the tetrachord of Mercury; though Diodorus asserts, that the lyre of Mercury had only three strings. This system did not long remain confined to so small a number of sounds. Choræbus, the son of Athis king of Lydia, added to it a fifth string; Hyagnis, a sixth; Terpander, a seventh, to equal the number of the planets; and at last, Lychaon of Samos the eighth.

This is the account of Boëtius. But Pliny says, that Terpander having added three strings to the four which were original, first played upon the cithara with seven strings: that Simonides joined to them an eighth, and Timotheus a ninth. Nicomachus the Gerasenian attributes this eighth chord to Pythagoras, the ninth to Theophrastus of Piereus, afterwards the tenth to Hysteus of Colophon. Pherecratus, in the dialogue of Plutarch, makes the system advance with a more rapid progress: he gives twelve strings to the cythara of Menalippides, and as many to that of Timotheus. And as Pherecratus was contemporary with these musicians, if we suppose that he really said what Plutarch attributes to him, his testimony will have considerable importance in a fact which was obvious to his own immediate observation.

But how shall we obtain any certainty among such a number of contradictions as are found not only in the doctrines of the authors, but in the order of the events which they relate? For instance, the tetrachord of Mercury evidently gives the octave or diapason. How then could it happen, that, after the addition of three strings, the whole scale was found to be diminished by one degree, and reduced to the interval of a seventh? This is, however, what the greatest number of authors leave us to understand; and among others Nicomachus, who tells us, that Pythagoras, finding the whole system composed only of two conjoined tetrachords, which between their extremes formed a dissonant interval, rendered it a consonance, by dividing these two tetrachords by the interval of a tone, which produced the octave.

Whatever be the case, there is at least one thing certain, that the system of the Greeks was insensibly extended as well above as below, till it reached and even surpassed the compass of a disdiapason or double octave; a series which they called a per-

fect system, and which was likewise termed the greatest and the most unchangeable; because, between its two extremes, which betwixt themselves formed a perfect consonance, were contained all the simple, the double, the direct, or the inverted chords, every particular system, and according to them the greatest intervals, which can take place in melody.

This whole system consisted of four tetrachords, three conjoined and one disjoined; and of a single note redundant, which was added below the whole to complete the double octave; from whence the string which formed it took the name of *proslambanomene*, or the additional string. This, one would imagine, could only form fifteen notes in the diatonic genus; there were, however, sixteen. This was because the disjunction being sometimes perceived between the second and third tetrachord, and at other times between the third and fourth, it happened, in the first case, that the sound *la* or A, the highest in the second tetrachord, the *si* or B natural, with which the third tetrachord began, immediately followed in ascending; or otherwise, in the second case, that the same sound *la*, with which note itself the third tetrachord begun, was immediately followed by *si* or B flat; for the first gradation of every tetrachord, in the diatonic species, consisted always of a semitone. This difference then produced a sixteenth sound, on account of the *si* or B, which was natural or flat according to its various positions in the different tetrachords. The sixteen sounds were expressed by eighteen different names; that is to say, that *ut* or C, and *re* or D, being either the sharpest or the middle sounds of the third tetrachord, according to the two manners of disjoining the tetrachords, they gave to each of these two sounds a name which determined its position.

But as the fundamental sound was varied according to the mode, from the situation occupied by each mode in the general system arose a difference of acuteness and gravity, which very much multiplied the sounds: for though the different modes had many sounds in common, there were likewise some peculiar to each mode, or to some of them alone. Thus, in the diatonic genus alone, the extent of all the sounds admitted in the fifteen modes enumerated by Aliphius amounted to three octaves; and as the difference between the fundamental sound of each mode and that of its contiguous sound was a semitone only, it is evident, that all that space divided by semitones produced, in the general scale, the quantity of thirty-four sounds practised in ancient music; which, if we deduct all the replicates of the same sound, and confine ourselves to the limits of an octave, it will be found to be chromatically divisible into twelve different sounds, as in modern music. This is obvious from the table placed by Meibomius at the front of Aliphius's work. These remarks are necessary to refute the error of those who believe, upon the credit of some moderns, that the whole of ancient music was limited to sixteen sounds.

With respect to the enharmonic and chromatic genera, the tetrachords were divided by very different proportions; but as they always contained four sounds and three consecutive intervals, in the same manner as the diatonic genus, each of these sounds, in its particular genus, bore the same names which corresponded with them in the diatonic. For this reason Rousseau, whom we follow, has not given particular tables for each of these genera. The curious may consult those of Meibomius, placed at the front of the work of Aristoxenus. They will there find six; one for the enharmonic genus, three for the chromatic, and two for the diatonic, according to the situations of each of these genera in the system of Aristoxenus.

Such, in its perfection, was the general system of the Greeks; which remained almost in the same state till the eleventh century, the time when Guy d'Arezzo made considerable changes in it. He added below a new string, which he called *hypoproslambanomene*, or sub-added, and above a fifth tetrachord. Besides this, he invented, as they say, a flat, to distinguish the second sound of a conjunctive tetrachord from the first of the same tetrachord when disjunctive; that is to say, he fixed the double signification of the letter B, which St. Gregory before him had already given to the note *si* or B. For since it is certain that the Greeks had for a long time these very conjunctions and disjunctions of the tetrachord, and of consequence signs for expressing each degree in these different cases, it follows, that this was not a new sound introduced into the system of Guido, but merely a new name which he gave to that sound; thus reducing to one degree what, among the Greeks, had constituted two. It must likewise be observed concerning his hexachords, which were substituted for their tetrachords, that it was less a change of system than of method; and that all which resulted from it was another manner of solfa'ing the same sounds. But the character of Guido, and the alterations which he made in the ancient scale, may be more properly resumed when we reach the period in which he lived. The different accounts of the system and its improvements, of the different kinds of music, and of the modes to be met with among ancient harmonists, are so various and so obscure, that, in these disquisitions, little or no satisfaction can be obtained. For ascertaining with accuracy the diversity of intervals, Pythagoras, the philosopher of Samos, invented the monochord, or the different divisions of one single string by which the consonances were produced, and found the same ratios which are given in the subsequent elements of music, in Malcolm's account of the scale, and in several other authors unnecessary to be enumerated. For a fuller and more exact account of this monochord, and its use, see the History of Music by sir John Hawkins, vol. I. p. 449. where the necessity of applying it to practice is inculcated by Guido.

Had succeeding writers upon the science been more attentive to the real constitution of the scale, and the principles derived from a monochord properly divided, we might have expected their account of the other phenomena in music to have been more precise and more perspicuous; but for a considerable time after that philosopher, the accounts of ancient music transmitted to us are either superficial and cursory, or unintelligible. The modes, of which Aliphius reckoned fifteen, are by Ptolemy limited to seven. Even of the seven Ptolemaic modes, it would seem that five must be merely possible and nominal; two only real and practical. These appear to coincide with the major and minor mode of the moderns, by which effects similar to those ascribed to the ancient modes are produced. Still, however, this hypothesis is attended with some difficulty. The effects attributed to the modes of the moderns seem to be no more than cheerfulness and melancholy; whereas it would appear that different sentiments

were thought to be naturally excited by all the different modes of the ancients, such as courage and terror, fury and complacency, &c. Yet if by ancient modes we are to understand any given intervals which predominate in a piece of music, it is far from being easy to conceive any other explication which will so rationally account for the modes of Ptolemy, as that which we have immediately before recited. A more particular detail of this author, of Boëtius, and of Aristides Quintilianus, than it is in our power to give, circumscribed as we are by limits much too narrow for such an undertaking, will be found in sir John Hawkins's History of Music, vol. I. These are some of the chief writers whose works remain to us, and have escaped the depredations of time. Most of the other ancient writers upon music either appear to have been lost, or only to have treated the subject occasionally. Among these may be reckoned Vitruvius, author of a treatise on architecture, who, in his description of theatres, takes the opportunity of proposing some musical improvements, of making some casual observations upon the art, and of describing an hydraulic organ. But as a more particular account of these would throw no additional light upon the theory of ancient music, for this we must once more remit the curious to Meibomius de re Musica, and to the history by sir John Hawkins above quoted.

The province to which our efforts are necessarily confined directs our attention not so much to the history of those who cultivated the art, as to the art itself, and its various revolutions.

The discovery of the monochord and its divisions was not the only speculation in music peculiar to Pythagoras. He likewise thought the earth and seven planets, or solar system, resembled a musical diapason; and from thence formed the romantic idea of the music of the spheres. For a more satisfactory account of this celestial concert, the curious reader may peruse the Somnium Sipionis, a fragment of Cicero, the Observations upon numbers by his commentator Macrobius, and Montucla's History of Mathematics, vol. I.

Pythagoras, the philosopher of Samos, as we have said above, who taught in Italy, was the first who investigated the relations of sound by measuring a musical string, and observing the tones produced by the vibrations of its different parts, whilst the others were at rest. These he expressed by numbers, and thus ascertained the ratio which one sound bears to another. This investigation was afterwards carried farther, and delineated more distinctly, by Euclid; and gave rise to a controversy which divided the theoretical writers on ancient music into two principal sects, viz. the followers of Pythagoras, who maintained that intervals could only be ascertained by the vibrations of sonorous bodies compared one with another; and those of Aristoxenus, who asserted the judgment of the ear to be the ultimate criterion of intervals. Perhaps neither were absolutely right, nor entirely wrong. Without ascertaining by experiments and calculations the distances of tones, or quantities of intervals, we can by no means obtain the same certainty of their exactitude, whether in tuning instruments of fixed scales, or in performing upon those whose notes admit of variation, and where the temperament is immediate and occasional. So far the Pythagoreans are right. Yet the Aristoxenians might likewise urge, that, though we could suppose a being acquainted with all the properties, relations, and modes of quantity, in their full extent; if such a one, with all this knowledge, should attempt from mere theory to compose a piece of good music, he might be eternally engaged in the same employment to no purpose, and have the mortification to see himself every instant outdone by a mere mechanical performer, who had been long inured to judge of intervals, and practised in the laws of harmony. In short, the whole powers of geometry and algebra may be exhausted, without producing a musical strain which will give real pleasure to the ear. An adept, therefore, in this delightful art, will regulate his practice by his theory, and confirm his theory by his practice. He will not imagine the necessity of experiment and calculation superseded by the decision of his ear; nor will he endeavour to extort from the abstract nature of numbers (which are equally applicable to all subjects that contain quantity) those rules which taste and sensation alone can suggest, and of which they are the ultimate standard.

Nicomachus the Gerasenian lived A. C. 60, and wrote a book called Introduction to harmony, which seems to be one of the clearest and most intelligible of the Greeks works.

In the Symposiaca of Plutarch is a dialogue on music, containing many anecdotes with respect to the invention of several different species of music and poetry. There Phrynis and Timotheus are recorded to have been stigmatized for adding what were esteemed supernumerary strings to the lyre, which at that time had only seven, to mark the different degrees of the diapason. But the additional strings were tuned by intervals less than diatonic. This dialogue, however, is acknowledged to be obscure, and its authenticity questioned.

After exploring what can be known concerning the ancient music, from the theories and writings of those whose works have been transmitted to us, the forms and powers of their instruments occur next to be examined. These can only be collected from verbal descriptions, or from designs either expressed in colours or by sculpture. From these, modern musicians have not scrupled to form a most contemptible idea of practical music among the ancients. But are we sure that the descriptions are perfectly complete and thoroughly understood? If they were, does there not still remain a possibility, that they might be tuned and handled in a manner productive of effects to which we are strangers? Of our instruments now in use, the difference between one manner of performing and another is so astonishing, that one should imagine it might render us cautious in forming any conclusions concerning instruments, which are perhaps neither perfectly described nor exactly delineated, described by authors of a period sufficiently distant to render the idioms of the language in which they wrote obscure. And though the forms exhibited in colours or by sculpture may be thought more permanent and more universally intelligible, they are yet sufficiently subjected to the injuries of time to render their representations suspicious. It cannot be doubted, but that the accounts of the ancients, of the power and efficacy of their music, were frequently fabulous and hyperbolical; but still they are such as, when divested of these accidental circumstances, must convince any man of common sense, who admits the evidence of history, that they are superior to what we at present experience in music with all its boasted improvements. It may well be admitted, that the miracles ascribed to Orpheus and Amphion are false in their literal sense; but no per-

son will imagine, that, even among the superstitious and illiterate vulgar, fables of this kind could have obtained any degree of attention, or be entertained with any other sentiments than those of ridicule, if the truths which they adumbrated had not been uncommonly striking. Nor would it have been relished as a tolerable legend, that music had the power of animating stones and trees, if its visible effects upon sensitive beings at that period had not been wonderfully transporting. It is therefore a degree of incredulity which does no great honour to the authority of modern testimony to doubt the assertion of Horace, when he tells us, that, by the force of music, the human savage was allured from his acorns, his brutal pastimes, and his sanguine broils, to the more decent habits and amiable employments of social life. It has been formerly observed, that among such nations as were esteemed barbarous, we meet with no accounts either of music or its instruments, which either deserve credit or attention. It is not easy to conceive how the Jews, who had made such a great progress in arts and civilization, should still have remained so backward in their musical acquisitions, as they must have been, if we take for granted the figures and powers of their instruments, as delineated by Kircher, and transcribed by sir John Hawkins. Nor will the advantages which are generally allowed to the instruments of other barbarous nations afford a satisfactory account how they were able either to compose or perform such pieces of music as we know them to have possessed. We must therefore with good reason suspect, that the authors of such descriptions have either been grossly ignorant of the subject, or shamefully careless and remiss in the performance of their task.

After the long and cruel devastation of the Goths and Vandals, music seems first to have been revived for the service of the church. It was then of two different kinds, one of which was called the Ambrosian and the other the Gregorian chant. Of these, the last prevailed, and became universal, till corrupted by the ignorance or false taste of its teachers and performers. This degeneracy became at last the subject of high remonstrance and complaint. It seems to have consisted in a total negligence of rhythmus, and in a perversion of that licence of gracing the notes, which is so essential to all emphatic and animated music. It became, however, so contagious and diffusive, that monarchs thought the rescue of the Cantus Gregorianus an object worthy of their interposition. They accordingly authorised more profound adepts and more accurate performers to teach and practise it in its purity through their several dominions. The *antiphonaries*, or books of ecclesiastical music, were rectified, and a more correct and legitimate taste re-established. Thus the Cantus Gregorianus once more triumphed over ignorance and barbarity, and obtained a reception worthy of its original sublimity. It is denominated among the French, and by Rousseau in particular, plain chant. That author scruples not to reckon it a precious remain of antiquity. For a short account of the nature and revolutions of this music, may be consulted the article Plain Chant in his Musical Dictionary. From whence it appears, that the Gregorian music was not originally different from the Ambrosian, but the latter only an improvement upon the former. One would be tempted to suspect, that the first gradation of this music towards its decline was occasioned by transferring it from verse to prose. In consequence of which, that strict and inviolable regard to measured sounds, so conspicuous in ancient music, and so effectually preserved by the aptitude of measured notes to measured syllables, was lost. There is, we know, even in prosaic compositions, a rhythmus. The Roman orators were accustomed to scan their sentences in prose. But though even periods of this kind were by no means emancipated from the laws of rhythmus, yet were they much more loose and indefinite than poetical numbers, which were constituted by feet and syllables whose quantities were determined. From thence, and from the cadences by which they are marked, alone, can result that regularity and satisfaction which in the musical ear acquiesces, and without which every thing is unintelligible. It was this religious observation of determined and regular quantities in ancient poetry which preserved and regulated the due proportion of sounds, and which, when abandoned, left the value of notes, with respect to their duration, impossible to be determined, till other characters and signs were superadded, which discovered the real estimate of every note, and showed to what degree it should be protracted, or by what quantity of duration limited. This seems to have been the next advance in musical improvement; but it had one pernicious effect, which was, to render music independent of poetry. Yet these sister-arts seem to be twin-born from heaven; and perhaps, in no case could the laws of nature have suffered a more cruel and unlucky violation than in separating the one from the other. Modulated sound is a more genuine, powerful, and universal vehicle of sentiment, than any articulate or arbitrary signs can possibly be. But articulate signs may be so happily adjusted by convention, as to express degrees, varieties, and modes of sentiment or emotion, which in modulated sounds are less definitely signified, if signified at all. Thus sounds give energy and sweetness to words, words variety and definiteness to sounds.

We have already observed, that Guy d'Arezzio, otherwise named Guido Aretinus, was the inventor of that disposition of the musical scale which is now in use. He could not, therefore, be the author of harmony, which we know to have been practised some centuries before his time, but only of a new set of characters by which it was expressed. This musician, by changing the tetrachords into hexachords, highly improved the scale, discovered more accurately the position of semitones, and rendered its intonation much more practicable. He likewise adapted the syllables *ut*, *re*, *mi*, *fa*, *sol*, *la*, to the various sounds which compose it, from the following Sapphic verses in a hymn to St. John.

UT queant laxis *REsonare fibris*
MIra gestorum *FAmuli tuorum*
SOLve polluti *LAbii reatum.*
SANCTE JOANNES.

The rhythmus in music, or the regular division and measures of sound, had formerly been determined by the quantities of a feet in poetry; and, independent of these, seems to have been entirely indefinite. The invention of a rhythmus capable of subsisting by itself, is ascribed to one Johannes de Muris. Yet there is considerable reason to believe that it had been invented by one Franco, who lived a number of years before him.

In these times there was a secular as well as sacred music. The Troubadours, or Provencal poets, composed songs of different kinds, which they sung to their harps or violins for public entertainment. Hence it happened, that harmony,

melody, and rhythm, admitted of immensely greater varieties than they had hitherto done. We have formerly said, that in ancient music, the quantities or values of every note were determined by those of the syllables to which they answered. It is, however, by no means improbable, that at a very early period, in their private rehearsals, or practice for improvement, whether in taste or execution, the musicians frequently played the instrumental parts without being accompanied either by the voice or the words to which they had been set. The impressions of those poetical measures to which the parts corresponded were abundantly sufficient to preserve in the memory of the performer the idea of the rhythm, and of course to determine the value of each particular note. But when airs were either set to pieces in prose, or composed without any regard to syllabical duration, the quantity of each note was absolutely indefinite. When therefore music begun to be set in parts, it was indispensably necessary that the points which mark the notes intended to correspond one with another should be set in direct opposition. Hence the denomination of counterpoint. But when characters, or different forms of characters, were invented for expressing the different durations of sounds, or their relative proportions one to another, the same precision in opposing note to note became less necessary, and was on that account less scrupulously observed. It might, perhaps, be neither an unpleasing nor uninstructive deduction, after having delineated the nature of simple counterpoint, to trace it through all its different species or divisions; but the contracted sphere in which we are at present constrained to move obliges us to confine these excursions. Such readers as may wish more profoundly and minutely to examine this matter, will find it more perspicuously and fully explained in sir John Hawkins's History. To this they may likewise recur for an idea of the characters or methods by which the precise duration of particular notes might be ascertained. For us, it suffices to add, that the method now in practice, which are explained in the following elements, will be found more simple, whilst at the same time it is equally expressive and intelligible.

The airs into which secular music was originally distinguished seem to have been the madrigal, the song, the cantata, the canon. These were vocal, or at least common to voices and instruments; but the solo, the phantasia, the concerto, were progressive changes in instrumental music. By what gradations they proceeded, and who were the inventors of each particular species, we cannot attempt to show; not only because such a disquisition would be incompatible with the limits of our plan, but because we should find it frequently impracticable either to investigate the hints from which such innovations arose, or the persons by whom they were made.

If music be allowed to possess imitative powers, it will follow, that in proportion as the objects are interesting, the imitation must likewise engage and command attention. From this, it will be acknowledged, that as imitation is the chief purpose of dramatic music: as the actions, characters, and situations exhibited in the drama are the most interesting that can possibly be displayed; and as the dramatic is allowed to be the most perfect of all possible imitations; so of all music, the dramatic, in its perfection, ought to be the most powerful and enchanting. It is therefore a research of no small importance to discover when this kind of music was first revived, and by what degrees it arrived at its present state.

It is generally agreed, that the Greeks and Romans sung their tragedies and comedies from beginning to end: but no monument of these compositions remains to us: so that the music of the drama is as really a modern invention as if no such thing had subsisted among the ancients, since the mere knowledge of a fact could by no means throw any light upon the manner in which it was produced. All that has been transmitted to us concerning the ancient theatrical music can only inform us, that it was pathetic and imitative to a high degree. But upon these hints few composers will think themselves sufficiently instructed to proceed. This arduous enterprise, however, was nobly begun and successfully prosecuted by one Jacapo Peri. A poet, whose name was Ottavio Rinuccino, in the city of Florence, having composed a dramatic pastoral upon the story of Apollo and Daphne, engaged this excellent musician to set it. Both being warmed with the same ideas, and animated by the same design, so happily succeeded, that other poets and musicians were generally approved and admired in proportion as they pursued the vestiges of these great masters. A second performance of the same kind, called Eurydice, composed by the authors of the former pastoral, was represented in Florence in the year 1600, upon occasion of the marriage of Mary de Medicis with Henry IV. of France. But a detail of the gradations by which theatrical music rose to its present perfection would be a task too extensive for the limits by which we are circumscribed. Nor is it in our power, for the same reason, to enter more minutely and critically into the nature of those compositions called operas. Let it suffice to add, that, in common with tragedy and comedy, they are representations of action. In consequence of this, they require the same unity of design, the same diversity of characters and passions, with the former. Hence it follows, that some parts of them will be simply narrative, some pathetic, and others more emphatically descriptive. Music suited to the first of these is called recitativo. Its distinguishing characteristics are, to express the nature and degree of sentiment exhibited by the speaker, to be scrupulously adapted to the peculiar genius of that language which it is designed to accompany; and to be exactly modelled according to the accents of that nation, for which it was formed. Some authors have pretended that the irresistible efficacy of melody was founded upon this principle alone. But if that position be true, in what manner shall we account for the wonderful influence of an Italian recitativo upon a British audience, and for other phenomena of the same kind too numerous to be mentioned? Such parts of the music as are intended for more pathetic declamations may be called airs. In these the words, both with respect to their quantity and order, may be treated with greater freedom. The melody is less in the tone of conversation, and the harmony more complex. In this, however, there is no small hazard lest sentiment should be lost in sound; and it requires a great degree of judgment, delicacy, and taste in the composer, at once to fill the harmony and pre-

serve the sentiment. The chorus is intended to express some emphatic event, to celebrate some distinguished hero, or to praise some beneficent god. It is properly the voice of triumph and exultation. The harmony should therefore be as full and expressive as possible. But for the rules of such compositions, one must refer the reader to such theoretical and practical musicians as have been most successful in describing and cultivating dramatic music. What remains for us is to subjoin a list of those who have been most remarkable for their accuracy in the theory, or for their excellence in the practice, of music.

Of John de Muris we have already spoken, who lived in the year 1330, and to whom, by mistake, has been attributed the invention of those characters by which, in modern times, the value of notes, and their relative proportions one to another, have been ascertained But this expedient for making visible the different durations of notes as constituent of one rhythmus or particular movement, we have found to be first introduced by one Franco, who lived prior to John de Muris.

Lasus was the first who wrote on music; but his work is lost, as well as several other books of the Greeks and Romans upon the same subject. Aristoxenus, the disciple of Aristotle, and leader of a sect in music, is the most ancient author who remains to us upon this science. After him came Euclid of Alexandria. Aristidis Quintilianus wrote after Cicero. Alyphus afterwards succeeded; then Guadentius, Nicomachus, and Bacchius.

Marcus Meibomius has favoured us with a beautiful edition of these seven Greek authors, with a Latin translation and notes.

Plutarch, as has already been said, wrote a dialogue upon music. Ptolemy, a celebrated mathematician, wrote in Greek a treatise intitled The Principles of Harmony, about the time of the emperor Antoninus. This author endeavoured to preserve a medium between the Pythagoreans and the Aristoxenians. A long time afterwards, Manuel Pyrennius wrote likewise upon the same subject.

Among the Latins, Boëtius wrote in the times of Theodoric; and not distant from the same period Martianus, Cassiodorus, and St. Augustine.

The number of the moderns is almost indefinite. The most distinguished are, Zarlino, Salinas, Valgulio, Galileo, Doni, Kircher, Mersenne, Parran, Perault, Wallis, Descartes, Holden, Mengoli, Malcolm, Baretti, Vallotti, Marcus Meibomius, Christopher Simpson; Tartini, whose book is full of deep researches and of genius, but tedious from its prodigious length, and perplexed with obscurity; and M. Rameau, whose writings have had this singular good luck, to have produced a great fortune without being read almost by any one. Besides, the world may now be spared the pains of perusing them, since M. D'Alembert has taken the trouble of explaining to the public the system of the fundamental bass, the only useful and intelligible discovery which we find in Rameau's writings. To these we may add Rousseau and Dr. Smith, author of a learned and mathematical treatise, intitled, Harmonics, or The Philosophy of Musical Sounds; Mr. Stillingfleet, author of the Principles and the Power of Harmony, or An Explication of Tartini's System; Dr. Pepusch, and his noble pupil the lord Abercorn; Mr. Avison, late organist at Newcastle, who wrote a treatise on Musical Expression with the politeness and elegance of a gentleman, the depth and precision of a scholar, the spirit and energy of a genius. Among the authors already mentioned, it would be unpardonable to omit the names of sir John Hawkins and Dr. Burney, each of whom has favoured the world with a history of music. There are also valuable treatises by Gunn, Kollman, Maxwell, Shield, and Dr. Calcott. An abridgement of the Musical Grammar of the last-mentioned ingenious author is attempted below: and we trust it will be found more worthy the attention of our readers than any thing else we could present to them on this subject. We still, however, beg to refer to the original work, for much curious and valuable matter, which we should not be justified in introducing here.

ELEMENTS OF MUSIC.

Part I.—The notation of music.

Chap. I.—Of the Staff.

Five lines drawn over each other, form a staff, or support for the notes of music.

On these lines, and in the spaces between them, the heads of the notes are placed.

The lines and spaces of the staff are counted upwards, from the lowest to the highest.

Every line, or space, is called a degree: thus the staff includes nine degrees, viz. five lines, and four spaces.

The notes of music consist generally of two parts, a head and a stem.

The head is either open or close (that is, white or black); and must always be placed on a line, or in a space.

The stem may turn up or down, without making any difference in the music.

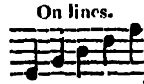
White notes.

On lines.

In spaces.

Black notes.

On lines.



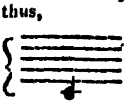
In spaces.

When more than nine notes are wanted, the spaces above and below the staff are used, and two more degrees are gained.

If more notes than these are required, then added lines are drawn above or below the staff, and the notes are placed on them; thus,

Line above.

Line below.



Any number of lines may be added above or below; thus the degrees of the staff are increased at pleasure.

In music for keyed instruments, when a staff is wanted for each hand, they are joined together by a brace; the upper staff for the right part, and the lower staff for the left.

When more than two staves are joined together by the brace, they contain music for different voices, or instruments, to be performed at the same time. This union of staves is called the score.

MUSIC.

Chap. II.—Of the Clef.

The notes of music are named from the first seven letters of the alphabet,

A, B, C, D, E, F, G.

When the melody, or tune, exceeds these seven, the same series of letters must be repeated.

A clef is a mark representing a letter, placed at the beginning of the staff, to determine the names of the degrees, and is always situated on a line. There are three clefs:

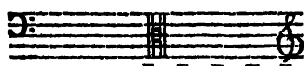
The F. The C. The G.

These are commonly called the base, the tenor, and the treble.

The sounds of music are distinguished by their difference in respect of pitch, and divided into high and low: the high sounds are placed in a staff with the G clef, and called treble; the low sounds are placed in a staff with the F clef, and called base.

The upper sounds of the base, and the lower ones of treble, are also called tenor, and sometimes placed in a staff with the C clef.

These three clefs are five degrees distant from each other; the C or tenor clef, being the note where the base ends and the treble begins. The G or treble clef, is five degrees above; and the F or base, is five degrees below, both inclusive.



f g a b $\bar{c}$ $\bar{d}$ $\bar{e}$ $\bar{f}$ $\bar{g}$

All the degrees of the staff depend upon the clef; and consequently take their names from that line on which the clef is placed. It must always be remembered, that these clefs are representatives of the letters, f $\bar{c}$ and $\bar{g}$.

The G clef must turn on the second line of the staff; all the notes on that line are called $\bar{g}$; the other degrees take their names from that, as the clef line.

The F clef must be placed on the fourth line of the staff, so that the two dots are in the third and fourth spaces: all the notes on that line are called f; the other degrees take their names from that, as the clef line.

When the C clef is placed so that the two cross strokes enclose the middle line, it is called the counter tenor, or viola clef.

The counter tenor clef is used for the high voices of men in vocal music, and for the viola or tenor violin in instrumental pieces.

When the C clef is placed so that the two cross strokes enclose the fourth line, it is called the tenor clef.

The tenor clef is used for the middle voices of men, and for the violoncello or base violin, in instrumental music, when the passage ascends above the base staff.

When the C clef is placed so that the two cross strokes enclose the lowest line, it is called the soprano, or canto clef.

The soprano clef is used for the voices of females and children. In Italy and Germany, no other clef is in general use for the harpsichord; the G clef being reserved for the violin, flute, &c.

In old vocal music, the C clef is placed on the second line, and called the mezzo soprano.

In old church music, the F clef is placed on the third line, and called the baritono.

In old French music, the G clef is placed on the first line, and called the high treble.

Chap. III.—Of the Notes.

Of notes in general.—The notes of music represent sounds, with their difference of pitch, and their duration in time. These two qualities are called the tune and time of notes.

When to any series of the seven letters the eighth is added, the whole number is termed an octave; and the word is frequently used to express the two extreme notes of the series, the first and the eighth.

That series of the seven letters which begins and ends with C, ascending or descending, is most satisfactory to the ear.

c d e f g a b $\bar{c}$

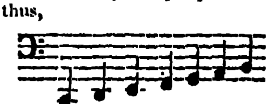
On keyed instruments, these notes are performed by striking the long keys, whose names are known by their situation with respect to the short keys, which are generally black.

The black keys are placed in alternate divisions of two and three, throughout the key-board; and, as the long key between the two short ones is always D, the other six letters may be readily found from that; E being the next long key towards the right hand; C the next towards the left, &c. &c.

The C nearest the middle of the instrument is the tenor clef note; the next G towards the right, is the treble clef note; and the nearest F towards the left, is the base clef note.

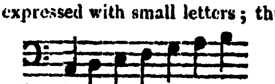
To distinguish the different notes of the same letter from each other, the Germans have adopted a literal notation, called their tablature, which, from its ingenuity and utility, deserves to be more universally known than it is at present.

The lowest series of seven notes, which includes both the divisions of short keys in the key-board (beginning with the two), is called by the Germans the great octave, being expressed by capital letters; thus,



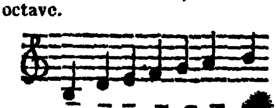
C D E F G A B

The next series of seven notes is called the small octave, expressed with small letters; thus,



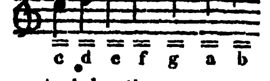
c d e f g a b

The next series commences with the C clef note, including the G clef; and being expressed by a small stroke over each letter, is called the once-marked octave.



$\bar{c}$ $\bar{d}$ $\bar{e}$ $\bar{f}$ $\bar{g}$ $\bar{a}$

The last series in general use is called the twice-marked octave.



$\bar{\bar{c}}$ $\bar{\bar{d}}$ $\bar{\bar{e}}$ $\bar{\bar{f}}$ $\bar{\bar{g}}$ $\bar{\bar{a}}$ $\bar{\bar{b}}$

The few notes below the great octave are marked with double capitals, and called contra tones. Those

above the treble form another series, called the thrice marked octave.

Any musical example, in which all the notes are of equal length, may be expressed by this tablature, without the assistance of the staff or of the clef. According to this notation we may observe,

The F clef note is the small f.

The C clef note is the once marked c̄.

The G clef note is the once-marked ḡ.

In vocal music these notes are sung with the syllables introduced, about the year 1022, by Guido; *ut, re, mi, fa, sol, la;* called by his followers the hexachord.

The French retain the original six, with the addition of *si* for the seventh.

ut, re, mi, fa, sol, la, si, ut.
c d e f g a b c

The Italians, for the sake of a softer pronunciation, have changed the *ut* into *do.*

do, re, mi, fa, sol, la, si, do.

The general scale of notes was formerly called the gammut, from the Greek letter gamma, placed on the lowest line of the base staff, or great G of the German tablature.

Of the tune of notes.—The tune of notes depends upon their relation to each other, and upon the distances between them. The intervals between the degrees of the scale are unequal; and, as some are nearly twice the distance of others, the words tone, and semitone, are employed to express them.

Those notes which on the key-board are not separated by a short key, are said to be distant from each other one semitone; those which have a short key inserted between them, are distant two semitones, or one tone. Thus, the distances between BC and between EF, are semitones; and those between CD, DE, FG, GA, and AB, are tones;—therefore, every series of the eight regular sounds, or of the octave, contains five tones and two semitones.

The greatest care must be taken not to misunderstand the words note and tone. A note is the sound which is heard, or the mark which represents it on the staff; but a tone is the distance between two notes, which are called by the names of two adjoining letters, and separated by one single key of the instrument. Thus, the distance from A to B is a tone; and therefore A is a tone lower than B, and B a tone higher than A.

The same observation must be applied to the semitones, which are sometimes called, though improperly, half notes. The distance from B to C is a semitone; therefore B is a semitone lower than C, and C is a semitone higher than B.

By comparing the sounds C D E F with the following sounds G A B C, we find that the distances of both these fourths consist exactly of two tones and a semitone; therefore any tune, formed by one, will be exactly similar to that of the other.

These two fourths, taken in succession, form a scale, of which the chief sound being C, is from thence called the key note. The descending series of this scale corresponds with the common tune of eight bells.

The effect of these notes to the ear depends upon the position of the semitones. This may be easily perceived by playing eight notes, from d, or e, or any part of the scale, which will not produce the same melody.

But if the same letters, in any octave higher or lower, are taken, the same tune will be heard.

This series of sounds, which is performed on the organ, &c. with the long keys, is called the natural scale, to distinguish it from that which employs the short keys intermixed with the others, called the chromatic, or artificial.

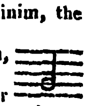
In the vocal scale of the solfeggio, the place of the semitone is ascertained by the syllables *mi fa* and *si do;* between all the others is the distance of a tone.

As the whole doctrine of melody, or the tune of notes, must depend on a right conception of the two semitones, and their places in the scale, great attention should be paid to this part of the subject by every musical student.

Of the time of notes.—The duration of a note, with respect to time, is known by its particular form; and the distinction between notes in this respect is shown by making them white or black, and by the stem and the hook.

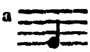
The three principal notes are, the minim, the crotchet, and the quaver.

The minim is a white note with a stem, made thus,



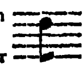
and is as long as two crotchets, or four quavers.

The crotchet is a black note with a stem, made thus,



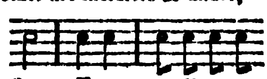
and is as long as two quavers.

The quaver is a black note with a stem and a hook, made thus,



and may be divided into semiquavers, or four demisemiquavers.

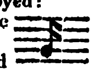
The proportions of these three principal notes to each other are therefore as under,



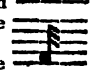
One Two Four
Minim. Crotchets. Quavers.

When the quaver is divided into smaller portions, the two following notes are employed:

The semiquaver, which is made like the quaver, but with two hooks,



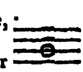
being half the length of the quaver; and the demisemiquaver, which has three hooks,



being one quarter the length of the quaver.

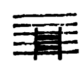
In slow music, especially that in the church style, two longer notes are used; the semibreve and the breve.

The semibreve is a round white note, without a stem,



and is as long as two minims, or four crotchets.

The breve is a square white note,

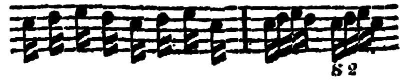


and is as long as two semibreves, four minims, or eight crotchets.

Those notes which are made with hooks may be grouped together by two, three, or four, &c. Thus:

Quavers.
Detached. Grouped.

Semiquavers.
Detached. Grouped.



This method is not only convenient in writing, but assists the eye in ascertaining the proportion of the notes, and is of particular use in vocal music, to distinguish the notes which are to be sung to each syllable.

Every musical piece is divided into equal portions of time, called measures. These are ascertained by straight lines, called bars, drawn down the staff. All the notes, therefore, contained between two bars, constitute one measure. The use of bars is not to be traced higher than the time when the English translation of Adrian le Roy's book on the tablature was published, viz. the year 1574; and it was some time after that before the use of bars became general. To come nearer to the point, Barnard's cathedral music, printed in 1641, is without bars; but bars are to be found throughout the Ayres and Dialogues of Henry Lawes published in 1653; from whence it may be conjectured that we owe to Lawes this improvement in music.

Every measure must contain a certain number of notes, according to the time marked at the beginning of the movement. Thus in common time, each measure includes a semibreve, or its value in minims, crotchets, or quavers, intermixed as the melody requires. The exact length of the measure is known by regularly dividing the time into equal portions, whether the notes themselves are long or short; as every measure must be precisely equal in time, during the continuance of the movement.

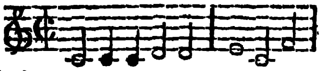
There are two chief species of time, common or equal—and triple or unequal time. In the first, we count two, four, or eight in every measure; in the last we count three, or six.

I. Common or equal time, contains one semibreve, two minims, four crotchets, eight quavers, or their value, in every measure. This time is known by a semicircle placed at the beginning of the staff, after the clef, thus:

(Handel: "See the conquering").

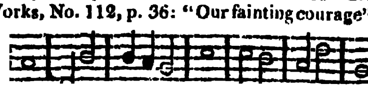
The barred semicircle is used to denote a quicker movement, and is called alla breve; because it was formerly written with one breve in a measure, thus:

(Orlando Gibbons, Dr. Boyce, V. II. 59: "O clap your hands").



This is now more commonly written with one semibreve in a measure, by dividing those of the alla breve into halves.

(Handel, "Saul," Dr. Arnold's edition of Handel's Works, No. 112, p. 36: "Our fainting courage").



All other measures are marked by figures, placed one over the other at the commencement of the staff.

The figure 2 above the figure 4, indicates two crotchets, or one minim, in each measure; and is called half time, being the division of the semibreve.

(German Hymn, Pleyel).

The most usual measures expressed by figures placed at the beginning of the staff, are the following:

3	3	3	6	6	9	9	12
2	4	8	4	8	8	16	8

Of these figures, the upper one shews how many parts are contained in the measure; and the lower one represents a word, showing how many of these notes constitute a semibreve. 2, signifies minims; 4, crotchets; 8, quavers, &c.; as in the following table:

3 Three / 2 Minims	3 Three / 4 Crotchets	3 Three / 8 Quavers
6 Six / 4 Crotchets	6 Six / 8 Quavers	9 Nine / 16 Semiquavers
	12 Twelve / 8 Quavers	

When it is necessary to lengthen a note by half its value, a dot is placed after it. Thus, a dotted minim is as long as a minim and a crotchet, or as three crotchets.

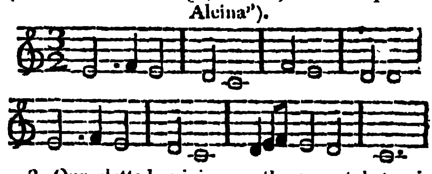
A dotted crotchet is as long as a crotchet and a quaver, or as three quavers.

II. Triple, or unequal time.—Of this time there are three different species in use; namely,

1. Three minims,
2. Three crotchets, } in a measure.
3. Three quavers,

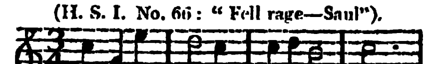
1. One dotted semibreve, or three minims, in every measure; thus,

(Handel's Italian songs, No. 64, "Verdi prati—Alcina").



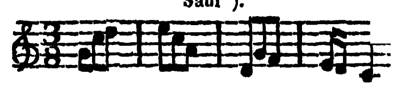
2. One dotted minim, or three crotchets, in every measure.

(H. S. I. No. 66: "Fell rage—Saul").



3. One dotted crotchet, or three quavers, in every measure.

(H. S. II. 128: "No, let the guilty tremble—Saul").



When two measures of three crotchets, or of three quavers, are united in one, by the omission of a bar, the time is called compound common;—common, because every measure is equally divided; and compound, because each half is a single measure of triple.

III. Compound common time has three species, in general use:

1. Six crotchets,
2. Six quavers, } in every measure.
3. Twelve quavers,

When two measures of six quavers are further united into one, they form a double compound of

twelve quavers in each measure, and are equal to four measures of three quavers. The omission of the bars makes some difference in the appearance of the music, and influences the counting, according to the degree of quickness in which the piece is performed. But, in other respects, the division of the measure has no power of altering the real nature of the time or tune; nor can the auditor perceive whether the triple time performed be expressed by the figures

12/8, 6/8 or 3/8

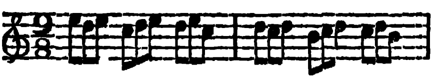
IV. Compound triple time is formed by dividing the meaures of simple triple into nine parts, and by dotting the measure note of the original time. Of this there are three species:

1. Three minims divided into nine crotchets.
2. Three crotchets divided into nine quavers.
3. Three quavers divided into nine semiquavers.

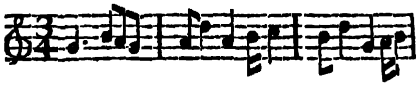
By a mere change of notation, the advantage is gained of presenting the simple measures clear to the eye, without the incumbrance of a dot to each minim.

(2.) Nine quavers, or three crotchet time, divided into triplets.

(H. S. IV. No. 319: " Consider, fond shepherd—Acis and Galatea").

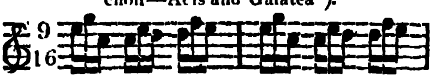


The commencement of this song, and the other parts, are in simple triple; thus,



(3) Nine semiquavers, or three quaver time, divided into triplets.

(H. S. II. No. 156: " Hush, ye pretty warbling choir—Acis and Galatea").



From these two species of compound time (common and triple), arise various kinds of mixt measures, which are in some parts equally, and in others unequally divided.

The triplets of common time, which are found in the place of each crotchet of the measure, have sometimes the figure 3 placed over them; but are generallyknown bybeinggrouped together, and then form one of the single parts of the whole measure.

The same use of the triplet occurs in triple time when the measure note is divided occasionally into three parts, instead of two.

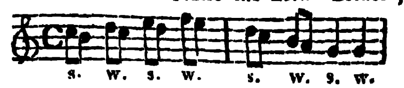
There is also a species of time, call quintuple, which contains five crotchets in a bar; but it is very seldom used.

Tartini considered this quintuple proportion as unfit for melody, and impossible to be executed. Time has shewn, that neither of these judgments were well founded.

Of the accent of notes.—The bars of music are not only useful for dividing the movement into equal measures, but also for shewing the notes upon which the accent is to be laid.

The measures of common time are divided into four parts; of these, the first and third are accented; the second and fourth unaccented. In the course of this treatise the accented will be termed strong parts, and the unaccented, weak parts of the measure.

(H. S. II. No. 119: " Praise the Lord—Esther").



The measures of triple time consist of three parts; the first strong, the two others weak; although the last part is rather strong, in comparison of the middle part.

(H. S. III. No. 233: " Up the dreadful steep").

In slow common time the accents are more frequent; but they are found in the same proportion on the first, third, fifth, and seventh quavers, which are the strong parts, while the second, fourth, sixth, and eighth, are the weak parts.

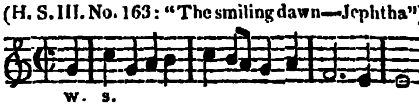
In three crotchet time, when divided into quavers, the first, third, and fifth quavers are strong; the second, fourth, and sixth, weak.

In six quaver time, the first and fourth quavers are strong; the others weak.

From the nature of accent arises the necessity of beginning some movements with only part of a measure; thus,

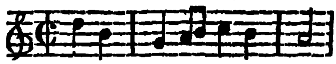
(1.) With a single weak part.

(H. S. III. No. 163: "The smiling dawn—Jephtha").



(2.) With a half measure.

(H. S. III. No. 162: " Welcome as the cheerful day—Jephtha").



When the composer intends that the weak parts of the measure should be made of more importance than the strong parts, such deviation from the regular accent will be termed emphasis.

The Italian words, *rinforzando*, *sforzato*, or their contractions, *rinf. rf. sforz. sf.* are often used to mark the emphasis, and sometimes are placed over accented notes.

As every species of measure may be subdivided by accents, according to the degree of quickness in which it is performed; so also the weak parts of every measure may be occasionally made emphatic at the pleasure of the composer.

To this species of effect may be referred all syncopated or driving notes, which begin on the weak, and end on the strong part of the measure.

Chap. IV.—Of the Rests.

When, in the course of a movement, silence is required for one or more parts of a measure, that silence is denoted by a rest, or rests, which are counted exactly in the same time as their corresponding notes would be, if performed.

The rests of the white notes are made in the middle of the staff; thus,

Rest of the breve. Semibreve. Minim.

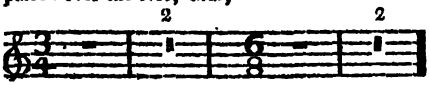
1. The breve rest extends from line to line.

2. The semibreve rest is made below the line.

3. The minim rest is made above the line.

The semibreve rest is also used in triple and compound time, to express the silence of one whole measure; and the breve rest is used for the silence of two measures.

In this last instance the figure 2 is generally placed over the rest; thus,



The rests of the black notes are made thus,

1. The crotchet rest turns to the right.

2. The quaver rest turns to the left.

3. The semiquaver rest turns to the left, and has two marks.

4. The demisemiquaver rest has three marks, and turns to the left also.

As the rests are inserted in the measures, to fill up the time when no sounds are to be heard, the performer should, of course, pay particular attention to the termination of the notes which precede them.

In playing keyed instruments, the rests are often much neglected: and, unless the player carefully raises the finger from the key (but not too far) at the exact commencement of the rest, the intended effect is destroyed.

Indeed Bach remarks, with his usual judgment, that to form a clear, pleasing, and expressive performer, three things are requisite:

1. To play correctly, by covering every note with the finger before it is struck (when possible), so that, in the most difficult passages, the motion of the hands may be scarcely perceived.

2. To make the instrument sing, by taking one finger off the key at the instant the other strikes the following note; and by never playing the notes short or detached except when expressly marked.

3. To play with expression by forcing the finger down upon the key (already covered and lightly touched,) according to the accent or emphasis.

On this subject see also Clementi's Introduction, p. 15. Dussek's Instructions, p. 8. Hullmandel's Principles, p. 19.

Chap. V.—Of the Sharps, Flats, &c.

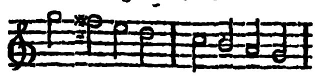
In explaining the tune of notes, the two different intervals of tone and semitone have been noticed. Every tone in the natural scale, is divided into two semitones, by an intermediate sound. This sound is produced, upon keyed instruments, by striking the short key inserted between two long ones, which are consequently tones to each other.

Of the sharps.—When the short key is to be played, instead of the natural note below it (on the left), then the same letter is used, with the additional term sharp.

Thus, to make another fourth, similar to the upper one of C, with two tones and a semitone, and placed immediately above it, at the distance of a tone; the F natural must be omitted, and the F sharp taken in its stead.

The character placed before F is called a sharp.

These two fourths united, form a new scale, of which G is the key note, exactly similar to C, but five degrees higher. Its descending series proves, by the melody, that the tones and semitones are between the same degrees of the scale.



As the scale of G is made complete by this alteration of the F alone, F is reckoned the first sharp.

For a similar reason (that of forming a new fourth above the upper one of G scale), C is termed the second sharp. Thus the series of sharps ascends by fifths; which, in respect of the letters, is the same as descending by fourths.

F C G D A
1 2 3 4 5

These sharps are performed, on keyed instruments, with the five short keys above; that is, on the right hand of the long ones: the division of two consists of C sharp and D sharp; the remaining three are F sharp, G sharp, and A sharp.

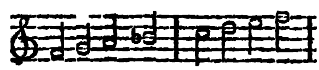
But, since there are no short keys between E and F, nor between B and C, which are only semitones to each other, F natural is employed to express E sharp, and C natural to express B sharp.

When these notes, E and B, become sharpened, their own long keys are never used; and, by their introduction, the series of sharps is extended to all the seven notes.

F C G D A E B
1 2 3 4 5 6 7

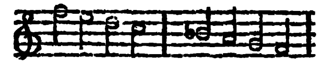
Of the flats.—When the short key is to be played, instead of the natural note above it (on the right), then the same letter is used, with the additional term flat.

Thus to make another fourth similar to the lower one of C, with a semitone and two tones, placed also below it (extending to the left), at the distance of a tone, the B natural must be omitted, and the B flat taken in its stead.



The character placed before B is called a flat.

These two fourths united, form a new scale, of which F is the key note; exactly similar to C, but five degrees lower. Its descending series proves, by the melody, that the tones and semitones are between the same degrees of the scale.



As the scale of F is made complete by this alteration of B alone, B is reckoned the first flat. For a similar reason (that of forming a new fourth below the lower one of the F scale) E is termed the second flat. Thus the series of flats ascends by fourths, which in respect to the letters, is the same as descending by fifths.

B E A D G
1 2 3 4 5

These flats are performed, on keyed instruments, with the five short keys below; that is, on the left of the long ones: the division of two consists of E flat and D flat; and the other three are B flat, A flat, and G flat. For the reason given concerning the sharps, B natural is employed to express C flat, and E natural is employed to express F flat. Thus the whole series of seven flats is completed.

B E A D G C F
1 2 3 4 5 6 7

This series is exactly the reverse of that given of the sharps.

It must be recollected, that every one of the short keys has two different letters for its name, according to the natural note for which it is employed.

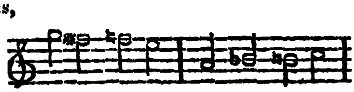
Thus, the middle key of the three short ones is equally used as the third sharp in the place of G natural below it, and as the third flat in the place of A natural above it.

When any number of sharps or flats are placed after the clef, at the beginning of the staff, they affect all the notes of the same letter in every octave throughout the movement, and are termed the signature.

Those which occur in the course of the movement, in addition to the others, are termed accidental, to distinguish them from those of the signature, which are essential to the scale of the original key note.

The accidental flats and sharps only affect the notes which they immediately precede, and those of the same letter which follow them in the same measure; but, if one measure ends, and the next begins, with the same note, the accidental character which alters the first note, is understood to affect the second.

Of the natural.—When any note, which has been elevated by a sharp, or depressed by a flat, is to be restored to its original place, the character called a natural is employed; which lowers the sharpened note, or raises the flattened note; thus,



The natural, although a very ancient character, was not used by Morley, Simpson, or Playford. They always employ the flat to take away the sharp, and the sharp to take away the flat, in the same manner as we now use the natural.

The natural, although evidently an accidental character, and a more general expression for the two others (the sharp and the flat), is sometimes placed essentially at the beginning of a strain, when a former part of the same movement has had a sharp or flat in its signature. (See Steibelt's sonatas, Op. 37, Turkish Rondo, p. 10.) According to its power, therefore, of raising or lowering any note of the scale, the natural must be always considered as representing a sharp or a flat.

After all the notes of music have been made sharp, the same series of letters begins again, and F, being the first, takes the name of F double sharp. It is performed, on keyed instruments, by striking the long key G natural; which is not, however, to be reckoned then as a tone from F natural, being placed on the same degree as F, and also consisting of two chromatic (or minor) semitones.

In the same manner, after all the seven notes of music have been made flat, the same series of letters begins again with B; and that, being the first, takes the name of B double flat.

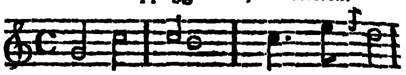
It is performed by striking the long key A natural two chromatic semitones lower. It is worthy notice, that, as the first sharp is the lowest, and the first flat the highest of the three short keys which are near to each other; so the first double sharp, and the first double flat (the only two in general use) are played with the two long keys which are enclosed by F sharp and B flat.

Chap. VI.—Of Graces, Characters, Marks of expression, and Abbreviations.

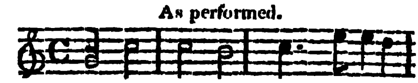
Of graces.—The principal graces of melody are, the appoggiatura, the shake, the turn, and the beat; with the mordent, beat, slide, and spring, peculiar to the Germans. The chief ornaments of harmony are, the arpeggio, tremando, &c.

I. The appoggiatura (vorschlag) is a small note placed before a large one of longer duration, from which it generally borrows half the value, and always occurs on the strong part of the measure.

The appoggiatura, as written.



As performed.

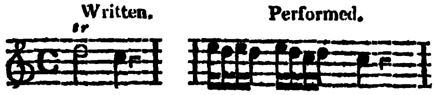


When a small note follows a larger one, and depends upon that for its time, the name of after-note (nachschlag) will be used in this work, to distinguish it from the appoggiatura.

This grace always occurs on the weak part of the measure.

II. The shake (triller) consists of a quick alternate repetition of the note above, with that over which the mark is placed; and commonly ends with a turn from the note below. It is usually denoted thus:

Written. Performed.

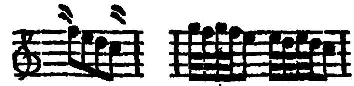


In this example the upper note is accented: there are, however, instances in which the composer seems to have designed that the lower note, or that over which the shake is placed, should be accented.

A series of continued shakes, on notes rising or falling by degrees, is called by the Germans triller kette, and by the Italians catena di trilli, both signifying a chain of shakes.

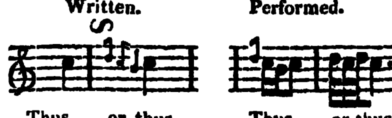
The passing shake (prall triller) is expressed in Germany by a particular character; and its definition varies with different masters, and in different passages. The explanation of Dr. Arnold (Op. XII. p. 38.) is therefore given here, with the mark he adopted for it.

Written. Performed.



III. The turn (doppelschlag) employs the note above and that below, in the following manner:

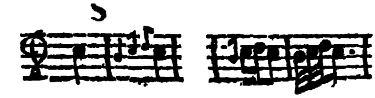
Written. Performed.



Thus, or thus. Thus, or thus.

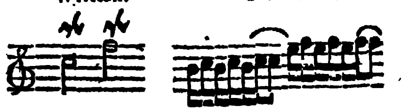
The inverted turn begins from the note below. (Dr. Arnold, Op. XII. p. 38).

Written. Performed.



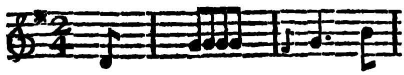
IV. The beat is the reverse of the shake (but without the turn), and made generally at the distance of the semitone below; therefore all the natural notes, excepting C and F, require the note below them to be accidentally sharpened for the beat.

Written. Performed.



In some cases of regular ascent, it is recommended not to make the beat with the semitone, unless particularly marked. (See Clementi, p. 11.)

In the half beat (zusammenschlag) the inferior note is struck on'y once, and at the same time with the principal note, but is immediately quitted. This is frequently used upon the organ, and particularly in the base. It may be written by a small note, like a short appoggiatura, and is very similar to the acciaccatura of the Italians.



V. The German mordent (beisser) is a species of beat, commencing with the note itself, and is either long or short; thus,

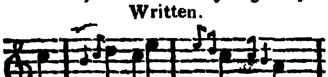
Long. Short.

VI. The German beat (anschlag) consists of two small notes, which form a skip, and descends one degree upon the principal note.

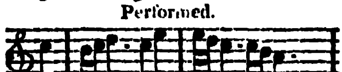
Written. Performed.

VII. The German slide (schleiffer) consists of two small notes, which move by degrees; thus,

Written.

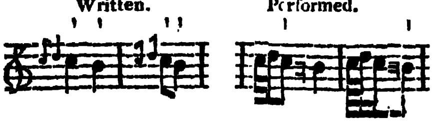


Performed.



VIII. The German spring (schneller) consists of two small notes, like the Italian mordente, but very distinct; thus,

Written. Performed.



To these graces of melody may be added those of harmony; the tremolo (bebung), or reiteration of one note of the chord; the tremando, or general shake of the whole chord, and the arpeggio (brechung), or imitation of the harp, by striking the notes of the chord in quick and repeated succession.

Clementi (Introduction, p. 9), has given an explanation of two different characters used for a chord (or combination of several sounds struck together), upon keyed instruments.

1. When a waving line is placed vertically before the chord, the notes are played successively, from the lowest ascending to the highest, and retained down the full time of the chord.

2. When an oblique line passes through the chord, it is played as before, with the addition of a note where the oblique line is placed; but this added note is not to be kept down.

Of the characters.—Characters used in music which do not form a part of any particular class, like the clefs, notes, rests, sharps, flats, naturals, or graces, are the tye or ligature, the pause, the repeat, the direct, the single bar, and the double bar. But, as the tye is similar in form to the slur, it will be classed among the marks of expression in the next section.

The pause (𝄐) is placed over a note, to signify that the regular time of the movement is to be delayed, and a long continuance of the sound made on that part of the measure.

If the pause is placed over a rest, then a stop of considerable length is made; and the part must be silent.

The same character is employed in those songs of Handel, Hasse, Vinci, &c. which have a second part, and are marked da capo, to shew the note upon which the piece is finally to terminate; but it is not always followed by the double bar.

The repeat (𝄋) is a sign employed to shew the place to which the performer must return to repeat the passage. It is usually found in rondos and da capo airs; and it marks that place, in the first strain, where the repetition is to commence. This mark is called in Italian, segno, or the sign.

The direct (𝆙) is a sign employed at the end of the staff, to shew upon what degree the first note of the following staff is placed.

When the inner sides of two bars are dotted, all the measures between them are to be repeated. See an instance of this kind of repetition, (H. S. I. No. 68: "Sin not, O King—Saul").

The word bis (twice) is sometimes placed over passages of this kind, whether the bars are or are not dotted.

The double bar is placed always at the end of a movement, and is sometimes used at other parts, to shew the rhetorical termination of a strain.

If the double bar is dotted on one or both sides, all the measures on the same side with the dots are to be repeated from the beginning, or from the antecedent double bar.

When the rhetorical termination of a strain does not coincide with the grammatical accent, the double bar is then totally distinct from the single bar, and the measures are only reckoned between the single bars, although the double bar may intervene.

(H. S. V. No. 374: "Above Measure—Semele").

This double bar does not affect the measure in which it is placed, but the time is kept exactly as if it were not inserted.

As it appears, from the preceding observations, that the double bar is very different and distinct from the single bar, the grammatical use of the latter must not be confounded with the rhetorical employment of the former.

If every piece of music ended with a complete measure, and if the necessity of commencing with single times did not sometimes exist, the double

bar might be neglected; but, as it is important to mark the termination of those strains which have their last measures incomplete, this character is adopted, and the double bar bears the same relation to the strain as the single bar does to the measure.

Every measure contains a certain number of notes, which are terminated by the single bar; and every strain includes a certain number of measures which are terminated by the double bar.

The chief *marks of expression* are, the slur, and the dash or point; to which may be added the tye, or ligature.

The tye is an arch drawn over two notes on the same degree, uniting them into one. Upon keyed instruments, the first only is struck; but the finger is kept down during the time of both.

The tye is also used to express those syncopated notes which, in the ancient music, were divided by the bar.

The slur is a similar arch, drawn over two or more notes, upon different degrees, and signifies that all the notes are to be played as smoothly and as much united as possible. In vocal music, it is placed over or under all the notes which are to be sung to the same syllable.

When the slur is placed only over two notes, the second is generally made shorter than its proper length. Formerly, this effect was produced by exact notation.

The dash is a small stroke, placed over those notes which are to be performed in a very short and distinct manner.

The point is a mark employed by many authors instead of the dash; but its principal use is to distinguish those notes from which an intermediate effect, different from the slur or the dash, is required, and yet uniting both.

When these passages are performed on keyed instruments, the finger is not kept close, as in the slur, nor raised, as in the dash, but dropped gently on the note, and taken off before the time is wholly completed.

There are other marks of expression, which have been lately adopted, to express the effect of certain Italian terms.

1. Crescendo, or increasing the sound from soft to loud, is marked by an angle, the lines extending to the right. <

2. Diminuendo, or diminishing the sound from loud to soft, by the contrary sign. >

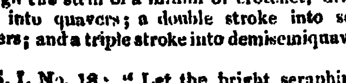
The union of both indicates that the first part of the passage is to be soft, the middle loud, and the last soft again, as the figure shews. <>

3. Rinforzando is denoted by smaller marks of the same kind, > <, which are to increase or diminish the note as marked.

When the same note, or similar passages, are to be repeated, much time is saved to the composer and copyist, by the use of abbreviations.

A single stroke, over or under a semibreve, or through the stem of a minim or crotchet, divides them into quavers; a double stroke into semiquavers; and a triple stroke into demisemiquavers; thus,

(H. S. I. No. 18: "Let the bright seraphim").



These passages, in Italian music, had formerly the word crome (quavers), or semicrome (semiquavers), annexed to them. At present we often use the term segue, to signify that we must perform the following notes in the manner in which the first are marked.

Another kind of abbreviation is very frequently used in modern music, viz. grouping the stems of minims like those of quavers.

Several other species of abbreviation are given in Koch's Lexicon, art. Abkürzung; and also in Clementi, p. 8. Shield, p. 121, &c.

Part II.—Melody.

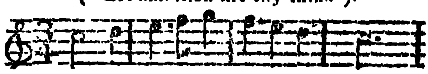
Chap. I.—Of Intervals.

A particular succession of single sounds forms a melody or tune.

Melody has, in respect of tune, two distinct motions; that of degrees, and that of skips.

A melody proceeds by degrees, when it moves to the next line or space above or below, as in the following example:

("Let ambition fire thy mind").

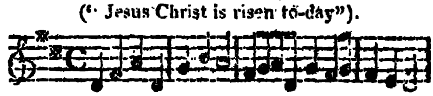


A melody proceeds by skips, when it omits one or more degrees as in the following example:

("When warlike ensigns").

In general, degrees and skips are intermixed; as in the melody of the Easter hymn.

("Jesus Christ is risen to-day").



The degrees and skips of melody are both called by the general term interval; which is the distance between two sounds, or their difference in respect of pitch. Every interval, therefore, implies two sounds, one acute, the other grave; in common language, high and low; and as, in measuring, it is usual to consider the termination of distance more than the space contained; so, in music, the notes which limit the interval, are both called by the name of the interval itself. Thus, from the F clef to the C clef, is contained the interval of a fifth, both terms inclusive; and C is said to be a fifth above F, and F a fifth below C.

The names of intervals are derived from the number of degrees which are contained between the two sounds; both extremes being reckoned inclusively. Thus the interval of a second consists of two degrees; and, as these may be distant from each other, either by one tone, or by one semitone, there are consequently two kinds of seconds, viz. a major second or tone, and a minor second or semitone.

The natural scale of music, which, proceeding by degrees, includes both tones and semitones, is called diatonic; a word compounded of dia and tonic, from the Greek *dia*, through, and *tonos*, a tone; because the greater number of intervals in the scale, viz. five out of seven, are tones.

The diatonic scale includes all the different intervals formed by the natural notes, and also all those which are produced in transposing the natural scale higher or lower, by the employment of sharps and flats. Those intervals which exceed the limits of the octave, as the ninth, tenth, eleventh, &c. being only replicates of the second, third,

fourth, &c. are omitted here, but will be particularly noticed in treating of harmony.

Those intervals which are less than the diatonic semitones, as from F to F sharp, &c. will be distributed, with all other intervals derived from them, into proper classes in the third chapter of this part, upon the genera.

As the intervals take their names from the number of included degrees, so also their species are ascertained by the epithets, major and minor, given them, according to the number of tones or semitones contained inclusively between their extremes. If the intervals were all equal in the scale, eight degrees would form only seven intervals; but, as there are two different distances of semitone and tone, for which the notation by the staff alone does not provide, there are consequently fourteen diatonic intervals. These are distinguished by the term major or minor, greater or less, and, in some few cases, sharp or flat.

I. The unison, or the same identical sound, although it cannot properly be reckoned an interval, is always considered as such, when employed in harmony; it is therefore inserted here among the intervals of melody.

II. The minor second is formed by two sounds, at the distance of a diatonic semitone, as B C and E F. C is a minor second higher than B, and B a minor second lower than C. The same is true with respect to E and F. This interval is sometimes called the flat second; and the term is useful in harmony. It is found also in the other scales, between F sharp and G, B flat and A, &c.

III. The major second or tone, although composed of two semitones, does not consist of two equal parts. This is evident from the notation itself; for, if the tone from F to G be divided by the sound F sharp, then the intervals between F sharp and G, or the diatonic semitone, will not be the same as that from F to F sharp, or the chromatic semitone. The former changes one degree, the latter remains on the same degree; and hence the former is, according to the theory of Zarlino, Rameau, and Pepusch, something larger than the latter. The tones and other intervals of the natural scale are, in this work, separated into semitones, &c. by the character called a direct .

IV. The minor third is composed of three degrees, and contains a tone and a diatonic semitone between the two extremes.

It is also divisible into three semitones, two diatonic and one chromatic.

V. The major third is composed of three degrees, and contains two tones between the extremes.

It is also divisible into four semitones, two diatonic and two chromatic.

VI. The perfect fourth is composed of four degrees, and contains two tones and a semitone between the extremes.

It is also divisible into five semitones, three diatonic and two chromatic.

VII. The sharp fourth is composed of four degrees, and contains three tones between the extremes, called by the ancients, on that account, tritone.

It is also divisible into six semitones, three diatonic and three chromatic.

These seven intervals (the unison included) may be considered, in a practical point of view, as primary; since, if they are rightly understood, all the remaining seven are easily known, being only compounded of these. Thus, the fifth is formed by uniting two of the thirds; the sixth, by the fourth and third; the seventh, by the fifth and third; and the octave by the fourth and fifth. Compared with the unison, second, third, and fourth, as primary; the fifth, sixth, seventh, and eighth, are secondary. This arrangement, however useful in the analysis of melody, is imperfect with respect to harmony, and the theoretical classification of the diatonic intervals. The true series comprehends the unison, octave, fifth, fourth, thirds, sixths, seconds, and sevenths, in the mathematical division of a musical string.

VIII. The flat fifth is composed of five degrees, and contains two tones and two semitones (not three tones): it may be divided into two minor thirds.

It is also (like the sharp fourth or tri-tone) divisible into six semitones; and when joined with that interval, completes the octave.

IX. The perfect fifth is composed of five degrees, and contains three tones and one semitone: it may be divided into a major and a minor third.

It is also divisible into seven semitones; and, when joined with the fourth, completes the octave.

X. The minor sixth is composed of six degrees, and contains three tones and two semitones: it may be divided into a minor third and a fourth.

It is also divisible into eight semitones; and, when joined with the major third, completes the octave.

XI. The major sixth is composed of six degrees, and contains four tones and one semitone: it may be divided into a major third and a fourth.

It is also divisible into nine semitones; and, when joined with the minor third, completes the octave.

XII. The minor seventh is composed of seven degrees, and contains four tones and two semitones: it may be divided into a fifth and a minor third; or into two perfect fourths

It is also divisible into ten semitones; and, when joined with the major second, or tone, completes the octave.

XIII. The major seventh is composed of seven degrees, and contains five tones and one semitone; and may be divided into a fifth and a major third.

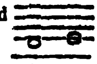
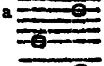
It is also divisible into eleven semitones; and, when joined with the minor second, or semitone, completes the octave.

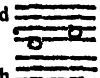
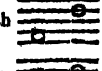
XIV. The octave is composed of eight degrees, and contains five tones and two semitones: it may be divided into a fifth and a fourth.

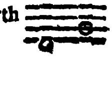
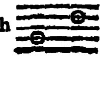
It is also divisible into twelve semitones, and may be considered as the replicate of the unison; being naturally produced by human voices when a woman or a child endeavours to sound a unison with any vocal tone of a man.

As the octave consists of thirteen sounds, and therefore has only twelve intervals, it must be recollected, that the fourteen diatonic intervals, just described, are obtained by reckoning the unison as one of them, and by distinguishing between the sharp fourth and flat fifth; both which are, upon keyed instruments, performed with the same keys. The seven notes of the scale form seven different species of octave, according to the places of the two natural semitones; and from these species, divided each into two parts, by the fifth or by the fourth, arise the eight tones of Italy, and the twelve modes of Germany.

When the lower note of any interval is placed an octave higher, or the higher note an octave lower, the change thereby produced is called inversion.

Thus a second  becomes a seventh 

a third  a sixth 

a fourth  a fifth 

The different intervals (seven), reckoned from each of the seven natural notes, form the following series:

Five major and two minor seconds.
Three major and four minor thirds.
Six perfect and one sharp fourth.
To these may be added their inversions:
Two major and five minor sevenths.
Four major and three minor sixths.
Six perfect and one flat fifth.

All the major intervals become minor, by inversion, and all the minor intervals become major; the sharp fourth becomes the flat fifth, and the unison inverted becomes the octave.

The major seventh of the key, from its resemblance to the tritone (its higher note being one of the two sounds which form the sharp fourth), is sometimes called the sharp seventh.

Rameau terms the intervals of the third, fifth, and seventh, fundamental; and derives the others, viz. the second, fourth, and sixth, by inversion, reckoning them downward, from the octave of the former.

All these intervals are found in the diatonic or natural scale; and, when this scale is transposed to any other pitch, higher or lower, by the use of sharps or flats, these intervals remain the same, as will be more fully seen hereafter.

Of all the diatonic intervals, the two thirds, major and minor, are by far the most important, and ought to be very perfectly understood; since upon them depends the nature of the scale or mode; and the thirds give their own epithets to the whole series of the seven notes, the scale itself being called major, when the third is greater, and minor, when the third is lesser.

There is another distinction, in respect of melodies formed of diatonic intervals, which, although in some measure obsolete, is yet useful for the student to understand. Those melodies which have their principal notes contained between the key-note and its octave are termed authentic direct, or principal.

Those melodies, on the contrary, which have their principal notes contained between the fifth of the key and its octave (or twelfth), are termed plagal, oblique, or collateral.

By these two divisions of the octave, authentic and plagal, are formed the arrangements of the eight Italian tones, and twelve German modes, before-mentioned.

Chap. II.—Of consonant and dissonant Intervals.

Although the terms consonant and dissonant are chiefly used in harmony, yet they are applicable, in a great measure, to the classing of intervals in melody.

The diatonic intervals are therefore divided into consonant and dissonant. Those which are most agreeable to the ear, as the octave, fifth, fourth, both the thirds, and both the sixths, are called consonant; those which, when compared with the others, are less agreeable to the ear, as both the seconds, both the sevenths, with the sharp fourth, are called dissonant.

The term dissonant is thought, by some authors, inapplicable to the degrees of melody which seem more natural to the human voice than the skips. This, however, is a prejudice, which a further consideration of harmony will remove.

The foregoing arrangement shews the propriety of distinguishing the species of seconds, thirds, sixths, and sevenths, by the epithets major and minor, according to the number of semitones included between the extremes; while the appellation of perfect is reserved for the fourth and fifth with the terms sharp and flat, when altered a semitone higher or lower.

The thirds and sixths, whether major or minor, are always consonant; the seconds and sevenths always dissonant; but the fourth and fifth are consonant only when perfect; when sharp or flat, they are dissonant. The alteration of these two last intervals, therefore, places them in different classes; and, although the terms major and minor have sometimes been applied to the fourth and fifth, in the present work those terms will not be used.

The consonant intervals are subdivided into perfect and imperfect. The unison (or prime), the octave, fifth, and fourth, are called perfect, because they are immutable, never changing from major to minor (or the contrary), but becoming dissonant whenever altered by a sharp, flat, or natural.

The thirds and sixths are called imperfect, because they are liable to change from major to minor (or the contrary), still remaining consonant.

The seconds, sevenths, sharp fourth, flat fifth, with all the chromatic and enharmonic intervals, are dissonant.

According to this classification, every passage of melody which moves by degrees, consists of dissonant intervals; but, as every other note is, in general, a transient sound, placed between two consonant notes, these seconds have not that harshness which is found in the passages which move by skips, as the sharp fourth, flat fifth, minor and major sevenths, &c.

All dissonant seconds in melody, are either passing or changing notes; and these are either regular, when found on the weak parts of the measure, or irregular, when used on the strong parts. If, therefore, these ornamental notes are taken away, a series of consonant intervals will remain.

A successive series of perfect fifths is not to be found in melody, and hence is forbidden in harmony. In melody, they would exceed the limits of our regular scale, as well as the compass of the voice; and, in harmony, they would produce new and unconnected scales, of which the species, major and minor, would be undetermined, through the omission of the thirds and sixths.

Chap III.—Of the Genera.

That scale of music which proceeds chiefly by tones, called diatonic, has been explained, and constitutes the principal part of every piece of music.

When all the artificial sounds are inserted between the natural sounds, a scale is formed of semitones alone, and called chromatic.

When a scale yet smaller in its intervals is formed, which contains in some places quarter-tones, it is called enharmonic.

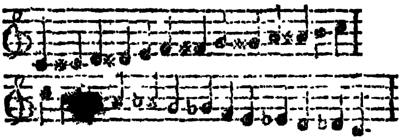
These three scales, the diatonic, the chromatic, and the enharmonic, form the three genera or kinds of melody now in use; and, although the terms are borrowed from the Greek authors, yet the modern ideas annexed to them are considerably different from their ancient signification.

The origin of the term diatonic genus has been explained. The chromatic takes its name from the Greek word chroma, colour, because the interspersed semitones give an ornamental effect to the diatonic or simple melody; and the enharmonic was so called, from its supposed excellence, being en-harmonic, that is, extremely musical.

The two last genera (chromatic and enharmo-

nic) are never used alone, but always intermixed with the diatonic. Hence it has been asserted, that all the genera, except the diatonic, are irretrievably lost That they are lost to us, in the precise sense of the ancient descriptions, is undoubtedly true; but we still retain the term chromatic, in a signification extremely analogous to its primitive meaning, and it seems proper also to retain the terms diatonic and enharmonic.

The chromatic scale generally ascends by sharps, and descends by flats, as in the following example:



From this scale several intervals, not yet described, arise, which are all discordant, and are chiefly used in melody, although they appear sometimes, by licence, in harmonical combinations.

The chromatic scale consists of thirteen sounds, which contain twelve intervals between them. Seven of these have been already described, among the diatonic intervals; the remaining five form another species of intervals, called extreme or chromatic Of these the chromatic semitone, the extreme sharp second, flat third, and flat fourth, are simple or primitive; the extreme sharp fifth, sharp sixth, flat seventh, and flat eighth, are compound or derivative.

I. The chromatic semitone is the distance or interval between any note, and that same note elevated by a sharp, or depressed by a flat.

This semitone was termed by the Pythagoreans apotome, and the diatonic semitone was termed limma. They contended, that the apotome, or distance from B flat to B natural, was larger than the limma, or distance from A to B flat. It is now, however, demonstrated, by the experiments of Mersenne, &c &c. that the theory of Zarlino and Salinas is true; namely, that the interval from A to B flat is the major semitone, and that from B flat to B natural is the minor semitone, contrary to the nomenclature of Boethius and the Pythagoreans.

In the chromatic scale, the semitones are alternately chromatic and diatonic; and, as there are only five of the former, while there are seven of the latter, two diatonic semitones will be found in succession, at the place where the natural semitone occurs.

From this important interval (the chromatic semitone) arise all the other chromatic intervals: they are all diatonic distances, increased or diminished by this interval; and hence they all take the additional chromatic epithet of extreme.

II. The extreme sharp second consists of a tone and a chromatic semitone, being composed of two degrees. Upon keyed instruments, this is the same as the minor third; which, however, consists of a tone and a diatonic semitone, and therefore contains three degrees.

III. The extreme flat third consists of two diatonic semitones, being composed of three degrees; and is the minor third, diminished by the chromatic semitone. Upon keyed instruments, this is the same as the tone, which contains only two degrees.

IV. The extreme flat fourth consists of a tone and two diatonic semitones, being composed of four degrees; and is the perfect fourth, diminished by the chromatic semitone. Upon keyed instruments, this is the same as the major third, which contains only three degrees.

These three last intervals, viz.

The extreme sharp second, the extreme flat third, and the extreme flat fourth, when inverted become the following: the extreme flat seventh the extreme sharp sixth, the extreme sharp fifth.

V. The extreme sharp fifth is the perfect fifth increased by the chromatic semitone, and consists of four tones, forming five degrees. On keyed instruments it is the same as the minor sixth, which consists of six degrees. This interval is seldom found in melody; but its inversion, the extreme flat fourth, is generally taken in its place. It is also divisible into two major thirds.

VI. The extreme sharp sixth is the major sixth increased by the chromatic semitone, and consists of five tones, forming six degrees. On keyed instruments it is the minor seventh, which consists of seven degrees.

It is also divisible into a major third and sharp fourth.

VII. The extreme flat seventh is the minor seventh, diminished by the chromatic semitone, and consists of four tones and two diatonic semitones forming seven degrees. On keyed instruments it is the major sixth, which only consists of six degrees. It is also divisible into three minor thirds.

VIII. The extreme flat eighth is the octave, diminished by the chromatic semitone: it is never used in melody, but is sometimes found in transient passages of harmony.

When a series is formed by uniting the ascending with the descending scale of the chromatic genus, a new kind of music arises, by the use of the interval formed between the sharpened note and the flat of the next succeeding note above. This scale is called enharmonic, and contains intervals smaller than the semitone; which, although not exactly half the semitone, are, however, from their near approach to that quantity called the diesis (that is, the division), or quarter tones.

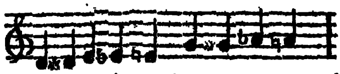
To form this interval, it is necessary that, of any two notes which are distant by the tone, the highest should be depressed, and the lowest elevated, by the chromatic semitone. Thus, from G to A is a tone. Now, if G sharp be taken instead of G and A flat instead of A, the difference between these extremes of the two chromatic semitones, G sharp and A flat, will form the enharmonic diesis or quarter tone.

To understand this, it must be observed, that the interval of a tone, in the theory of harmonics, is not always the same. That tone which is between the fourth and fifth of the scale, is supposed to be divided into nine small parts, termed commas; while that which is between the fifth and sixth of the major scale, is divided only into eight commas. The diatonic semitone consists of five commas, and the chromatic semitone of three, or four, according to the magnitude of the tone.

The two chromatic semitones, therefore, being taken from the minor tone (of eight commas), leave a residue of two commas for the diesis or quarter tone: hence on the Temple organ, and on some other instruments, the tones from G to A, and from D to E (which are naturally minor, or of eight commas), are divided into three parts, by two distinct keys, one for G sharp, another for A flat: also one for D sharp, and another for E flat. But upon keyed instruments, in general, the temperament, or method of tuning, is such, that the

single short key between the two longer keys serves for both purposes, that between G and A being turned higher than G sharp, and lower than A flat.

The enharmonic scale divides each tone into two chromatic semitones and the quarter tone; thus,



In some examples of the enharmonic scale, the intervals, F flat and E sharp, as also C flat and B sharp, are inserted; but they do not belong to that scale. This distance, as Dr. Pepusch observes, is smaller than the quarter tone.

This arises from the division of the diatonic semitone into two quarter tones, and a smaller interval, termed the hyperoche, which is found by theoretical calculation to be nearly a comma and a half.

Such are the three modern genera, the diatonic, chromatic, and enharmonic.

Chap. IV.—Of Keys or Scales, and of their two Modes, major and minor.

A diatonic scale, of which the notes bear certain relations to one principal note from which they are all, in some respects, derived, and upon which they all depend, is termed a key; and the principal note is called the key note, or tonic.

Every scale in which the two diatonic semitones are found between the third and fourth degrees, and between the seventh and eighth degrees, ascending from the tonic, is termed the major mode of that key; because the interval between the tonic and its third (or mediant), consists of two tones; that is, of the greater third. The only series of this mode among the natural notes, is that which commences with C; and hence this key must be taken as an example of all the major scales.

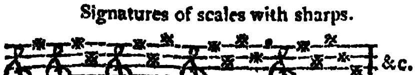
Every scale in which the two diatonic semitones are found between the second and third degrees, and between the fifth and sixth degrees, as ascending from the tonic, is termed the minor mode of that key; because the interval between the tonic and its third (or mediant), consists only of one tone and one semitone, that is, of the lesser third. The only series of this mode among the natural notes, is that which commences with A; and hence this key may be taken as an example of all the minor scales. See Key.

We have already shewn how the introduction of sharps changes the pitch of the tone, without altering the relative intervals of the scale. All the other major keys with sharps are constructed in the same manner, viz. by sharpening the fourth of the former key, to make a new sharp seventh, or leading note, to the following scale.

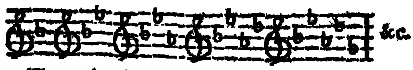
It has been also shewn that the introduction of a new flat takes place on the seventh of the original key, which then becomes the subdominant or fourth of the next scale: hence are formed scales with flats.

When the whole number of sharps and flats are placed at the clef, instead of being occasionally inserted before each note as they occur, such collection of sharps, or of flats, is termed the signature.

Signatures of scales with sharps.



Signatures of scales with flats.



The scale of F sharp with six sharps, being the same on keyed instruments as that of G flat with six flats, all the signatures beyond six may be expressed by a smaller number, by changing the name of the tonic.

Thus C sharp with seven sharps, is the same as D flat with five flats; and C flat with seven flats, is the same as B with five sharps, &c. &c. &c.

The minor scale not only differs from the major, as before observed, in the place of its semitones, but also in the variation of its scale, of which the ascending series differs from the descending one.

The minor mode requires, that whenever the seventh of the scale (which is naturally a tone below it) ascends to the eighth, it should become sharp, as the proper leading note or sharp seventh to the tonic. Now, the insertion of this essential note in the signature, would appear irregular; it is therefore always omitted in the signature, and placed accidentally before the seventh which it is to elevate, whenever the melody requires its use.

That this leading note or sharp seventh is essential to the key, although not to its signature, may be proved by performing the subsequent melody, omitting the sharp F.

("Our fears are now.")

In which instance, the harshness produced by F natural, if taken instead of F sharp, is extremely perceptible.

As the signature, therefore, does not decide the key or scale of the movement, a careful observation must be made, whether any accidental sharps or naturals occur in the first phrase or section. If any such are found, the tonic is on the next degree above them; but, if none are used, then the signature itself determines the major tonic, which is always the note above the last sharp, or the fourth note below the last flat.

The accidental sharp used in the minor mode raises the minor seventh of the scale a chromatic semitone: hence the minor scale may be said to belong to the chromatic genus.

The minor scale whose tonic is found on the sixth note ascending of that major scale which has the same signature, is termed the relative minor, because its signature is similar to that of the other.

These tonics, it may be observed, are one degree below the last sharp of the signature.

In the signatures with flats, the relative minor (or sixth of the key) is always on the third degree above the last flat.

Every major scale, when its third and sixth are depressed by the chromatic semitone, becomes a minor scale on the same key note, and will be called the tonic minor.

But, as the signature requires that the essential sharp seventh should not be inserted at the clef, the tonic minor must have in its signature another flat, making in all three flats more, or three sharps less than the major scale of the same key note.

That change which arises from the performance of the same melody in a higher or lower pitch, is called transposition.

Every melody in a major scale may be transposed into any other major scale, by altering the signature according to the pitch of the new tonic. The same alteration may take place in every minor melody. When, however, any tune is performed in the relative, or in the tonic minor, which tune was originally major, such change is not called transposition, but variation.

When, in the course of a melody, the tonic is changed, and the original scale altered, by the introduction of a new sharp or flat, such change is called modulation. This will be further explained in treating of harmony.

Every scale has two others immediately connected with it, one on the fifth above, which adds a new sharp to the signature; the other on the fifth below (or fourth above), which adds a new flat to the signature. These two scales are called attendant keys; an epithet given them by Dr. Boyce, in his manuscripts.

As every major key has a relative minor, and as this relative minor has its two attendant keys, hence arise, from every signature, six scales, nearly connected with each other: three with major thirds, and three with minor thirds.

Of these two are principal, viz. the major and minor of the signature itself; and four are subordinate, viz. the attendant keys, both of the major and of the minor: these require another sharp or flat, to complete their scales, when a modulation occurs.

Thus, in the major scale of C, its attendant scales are G (its fifth), with one sharp, and F (its fourth), with one flat; to which are annexed the relative minor A, and its two attendant scales, viz. E minor with one sharp, and D minor with one flat.

The same arrangement takes place in every key; and it is necessary to observe, that when the minor key is first taken, the major key of the same signature is called the relative major, and is found on the minor third above the original minor key-note.

Chap. V.—Of the Qualities of the Notes which compose the Scale.

Every one of the seven notes which form the scale of any key, major or minor, has an effect peculiar to itself: from this effect they derive particular names, which are these.

I. The tonic, or key-note, before described is that chief sound upon which all regular melodies depend and with which they all terminate. All its octaves, above or below, are called by the same name.

II. The dominant, or fifth above the key-note, is that sound which, from its immediate connexion with the tonic, is said to govern it; that is, to require the tonic to be heard after it, at the final perfect cadence in the base.

III. The subdominant, or fifth below the key-note, is also a species of governing note, as it requires the tonic to be heard after it in the plagal cadence. It is the fourth in the regular ascending scale of seven notes, and is a tone below the dominant; but the term arises from its relation to the tonic, as the fifth below.

These three principal sounds, the tonic, dominant, and subdominant, are the radical parts of every scale; of the minor, as well as of the major. *All melodies whatever are derived from these sounds, and are wholly dependent upon them.*

IV. The leading note, or sharp seventh of the scale, is called, in Germany, the subsemitone of the mode. This is always the major third above the dominant, and therefore, in the minor scales, requires an accidental sharp or natural, whenever it occurs.

V. The mediant, or middle note between the tonic and dominant ascending, varies according to the mode; being the greater third in the major scale, and the less third in the minor scale.

VI. The submediant or middle note between the tonic and subdominant descending, varies also according to the mode, being the greater sixth in the major scale, and the lesser sixth in the minor scale.

VII. The supertonic, or second above the key-note, has seldom been distinguished in England by this or any other appellation. In theory it is considered as a variable sound, being a comma higher in the major scale than when the mode changes to the relative minor.

The leading note and the subdominant are the two characteristic sounds, by one of which every scale, whether major or minor, is known, and its tonic immediately ascertained.

Thus, in sharp signatures, the leading note is a species of index, which points invariably to the next degree above, as its major tonic: this is always the last sharp in the major mode.

In flat signatures, the subdominant is also a species of index, which points to the fourth degree below, as its major tonic: this is always the last flat in the major mode.

In the minor modes whose signatures have less than four sharps or four flats, the subdominant, being always one of the natural notes, is not apparently a characteristic of the key; and therefore, in those modes, the leading note is the only certain index from which the key-note is to be found.

The great importance of these two notes appears evident, when, in occasional modulation, the new key is required to be found by their assistance. In all flat signatures (F major, B flat major, E flat major, &c.) the leading note is a natural; and this is the sharp seventh of the key.

In the sharp signatures, on the contrary, the subdominant is distinguished by a natural, and requires, in modulation, the alteration of the sharp in the signature.

Hence it appears, that whenever the characteristic note of the new key is marked by a natural that natural always has the effect of a sharp, or of a flat; of a sharp, when it is a leading note; of a flat, when it is a subdominant.

In the music of Corelli, Geminiani, Handel, &c. the general rules of finding the tonic, either in the major mode, by the characteristic notes of the signature, or in the minor mode, by the leading note accidentally inserted, are not always sufficient.

When, instead of the complete series of sharps or flats of the signature, the last sharp or flat is suppressed, and inserted accidentally when requisite (like the leading note of the minor mode) such deviation from the usual method of notation will, in this work, be termed the ancient signature.

Thus, in the seventh and twelfth sonatas (of violin solos) of Corelli, opera quinta, the signatures appear to be either C major, or A, its relative minor; but the accidental notes, C sharp and B flat, shew that the real key is D minor, and that the B flat, which is used in the modern signature is omitted at the clef.

Examples of the ancient signature of D minor may also be found in the third and fifth concertos of Geminiani, opera seconda, and in the fourth concerto of opera terza. For instance, the first movement of his third concerto begin thus:

Here the key is known to be D, by the accidental C sharp, and to be also D minor, by the natural F, which remains unaltered, as in the signature.

The same ancient method of notation is sometimes found in the key of G major, where the sharp of the leading note F, is inserted accidentally when requisite; as in the following example from the first chorus of Handel's Oratorio of Saul, How excellent thy name, O Lord. One of the intermediate movements commences thus:

("The youth inspired by thee, O Lord.")

Here the key is known to be G by the sharp before the F, which is used in the second treble as a third below the A; and the B natural of the clef shews it to be G major.

Part III.—Harmony.

Chap. I.—Of the Triad.

Two or more melodies, heard at the same time, form harmony; and the different combinations of notes in harmony are termed chords.

The union of any sound with its third (major or minor) and its perfect fifth, forms the harmonic triad, or common chord.

This is termed the major or minor triad, according to the nature of its third.

When the octave of the lowest note is added, four sounds are heard in the harmony.

There are also, besides these two consonant triads, two dissonant triads; one diatonic, the other chromatic.

I. The diatonic dissonant triad, or diminished triad of the Germans (B, D, F) consists of two minor thirds.

II. The chromatic dissonant triad, or superfluous triad of the chromatic scale (C, E, G sharp), consists of two major thirds.

The consonant triads are formed of the two dissimilar thirds, major and minor, united; the dissonant triads are formed of two similar thirds, both minor or both major.

In the natural diatonic scale there are six consonant triads; three major and three minor.

All the major triads become minor, by flattening their thirds; and all the minor triads become major, by sharpening their thirds; thus,

The diatonic dissonant triad has (by licence) its third sometimes flattened and sometimes sharpened; and thus are formed two altered triads, which are very seldom used.

These altered triads consist of a major and an extreme flat third, and are consequently both chromatic.

The prime, or lowest note of the triad, was called by Rameau its fundamental base. In this work, the term radical base, or simply the root, will be adopted.

The roots of the two consonant triads are easily understood, as every radical base must have a perfect fifth; but the roots of the two dissonant triads and of the two altered triads cannot be explained till the nature of discords is known.

When the three sounds of the triad are taken as an accompaniment, and the root remains in the base, the chord assumes three different positions.

The first position is that of 3d, 5th, and 8th.

The second, of 5th, 8th, and 3d.

The third, of 8th, 3d, and 5th.

It must be observed, that the second position, in reality, consists of the fifth, eighth, and tenth, and the third position, of the eighth, tenth, and twelfth of the root; but, as the tenth and twelfth are octaves of the third and fifth, and as they are represented by the same letters, they are also called by the names of third and fifth, whatever may be their distances above the root.

When the lowest note, instead of being the root, is the third or the fifth of the triad, such change is termed inversion.

The inversions of the triad differ from its positions; as the former relate to the whole harmony, including the base, and the latter to the accompaniment alone, independent of the base. Hence every triad has three positions, but only two inversions; for, when the root is in the base, the chord is called direct, whatever may be the positions of the accompaniment.

I. The chord of the sixth, is the first inversion of the triad, when the base note becomes the third of the harmony, instead of the root. This chord, in the figures of thorough base, is expressed by a 6; to which also belongs the third of the lowest note (or fifth of the root); and, in the practice of counterpoint, the octave of the lowest note is either omitted, or, if four parts are requisite, the sixth or the third may be doubled.

The same arrangement takes place in the minor triad, and its first inversion: in the first inversion of the diatonic triad, B, D, F, however, the sixth is never doubled, but the octave preferred, when four parts are requisite.

A stroke through the figure six, thus 6̸, elevates the sixth note from the base, a chromatic semitone, and when used on a minor sixth, makes it the first inversion of the dissonant triad.

When the same mark occurs on a major sixth, it makes it the first inversion of the altered triad.

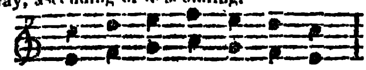
These two chords, which are of great importance, will be hereafter distinguished by the names of the sharp sixth and of the extreme sharp sixth; the first always accompanied by a minor, and the second by a major third.

II. The chord of the fourth and sixth, is the second inversion of the triad, when the base note is the fifth of the harmony, instead of the root. It is expressed, in thorough base, by a 4 under a 6, and, in four parts, the three positions of the triad are used as its accompaniment without any regard (as in the chord of the sixth) to the omission of one note, or the doubling of another.

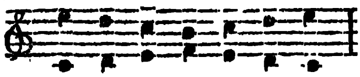
Before the harmonical succession of triads can be rightly understood, it is necessary to explain the different motions of the parts which constitute harmony. Two of these are essen-

tial, viz. the direct motion and the contrary motion.

In the direct motion, the parts move the same way, ascending or descending.



In the contrary motion, one part rises, while the other falls.



By the knowledge of these two motions, the power of avoiding many harmonical irregularities may be obtained, and the following rules of harmony correctly observed.

I. All consecutive octaves and fifths must be avoided in the direct motion.

II. All unnecessary skips are to be avoided, and all the chords are to be taken as closely and as much connected as possible.

III. All false relations (such as the extreme sharp second, &c.) are disallowed, unless for the expression of some particular effect.

IV. All irregular motions of the parts in harmony are to be avoided. Every major or sharp interval ought to ascend, and every minor or flat interval ought to descend; that is to say, the part in which those intervals are found in combination, is to rise after the sharp, and to fall after the flat. This rule, however, is always subordinate to that of avoiding octaves or fifths, and is not regarded when the melody is to produce an effect opposite to the rule. The internal parts of harmony, however, are to be regulated by these observations.

Of harmonical progressions.—The term progression will be used, in this work, in contradistinction to the term modulation, to signify that succession of triads or perfect chords, which, by being confined to the scale of the original key, only admits the tonic and its two attendant harmonies, occasionally interspersed with the relative tonic and the two harmonies attending on that scale; whether the original mode be major or minor.

Although a change into the relative scale implies a partial modulation, yet in all cases, where the new scale remains undecided, by the omission of the leading note, and the original tonic still continues a predominant sound, the term progression will be retained.

As the scale consists of seven different notes, it is evident that two triads, which only contain five notes (one note being common to both), cannot decide the key.

If, however, three different chords are taken, the key may be decided: this is performed by the progression of tonic, subdominant, and dominant.

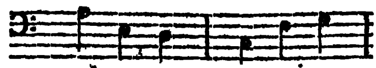
Thus, in the tonic harmony, are found the 3d and the 5th
In the subdominant, the 4th and 6th
And in the dominant, the 2d and 7th
} of the root of the scale.

The major mode, with its relative minor, and the four attendant harmonies, may be thus arranged:

Tonic. Domt. Subdt. Rel. Min. Its Dt. Its Subdt.

The minor mode, with its relative major, and the four attendant harmonies, may be thus arranged:

Tonic. Domt. Subdt. Rel. Maj. Its Subdt. Its Dt.



The motions of the radical bases or roots of these chords, are reducible to six, divided into three classes.

I. The dominant motion, or ascent of the 4th or fifth.

II. The mediant motion, or ascent of the 3d or 6th.

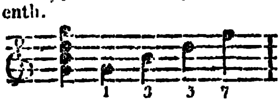
III. The gradual motion, or ascent of the 2d or 7th.

These may, of course, be inverted, and become the same descending.

Of these motions, the dominant and the mediant are regular, having a sound common to both chords; but the gradual is irregular, as the chords have no connexion with each other.

Chap. II.—Of the dominant Seventh, its Inversions, Resolution, and of Modulation.

When a minor seventh is joined to the major triad, a chord of four different sounds is formed, and, as this only occurs when the fifth of the key is the base note, the harmony is called the dominant seventh.



The note which forms the discord in this harmony, is the subdominant or fourth of the scale; and, being a minor interval, requires the part in which it is heard, to descend one degree.

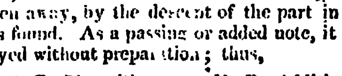
In the major mode, this descent is a semitone.

In the minor mode, the E becomes flat, and the descent is consequently that of a tone.

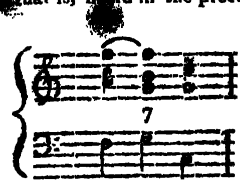
The major third of the dominant, which is also the sharp seventh or leading note of the scale, must ascend. Thus, in the major scale, the two characteristic notes are united, and form, between themselves, the interval of the flat fifth, of which the root is the dominant.

The dominant seventh is used, like all other discords either by transition, addition, or suspension; and must in all cases be resolved, that is, taken away, by the descent of the part in which it is found. As a passing or added note, it is employed without preparation; thus,

I. By Transition. II. By Addition.



But, as a suspended note, it must be prepared, that is, heard in the preceding harmony; thus,



In this instance, the F prepares the seventh in the first harmony; is heard as a discord in the second, and resolves, by descending to E, in the third.

There are several other sevenths, used in harmony, upon the different triads of the scale (whether consonant or dissonant), in both modes. These sevenths, although not exactly chords of the dominant, are nevertheless used in its place, to avoid modulation. They also preserve a uniform motion in the progression of their roots, and, at the same time, produce a melody, descending by degrees, in the original key. These are,

I. The minor sevenths with minor thirds, on the triads of A, D, and E, which belong to A minor.

II. The major sevenths with major thirds, on the triads of C and F, which belong to C major. These are often found in passages of transition.

III. The minor seventh with the flat fifth, upon B.

IV. The extreme flat seventh, upon G sharp in A minor, formed of three minor thirds.

The seventh, consisting of four sounds, admits of four different positions.

The first position is that of 3d, 5th, 7th, and 8th.

The second, of 5th, 7th, 8th, and 3d.

The third, of 7th, 8th, 3d, and 5th.

The fourth, of 8th, 3d, 5th, and 7th.

These positions, like those of the triad, contain the tenth, twelfth, and fourteenth of the root, when the third, fifth, and seventh, are taken above the octave.

This harmony, which consists of four different sounds, has, consequently, three inversions, besides its direct form of 3d, 5th, and 7th, just described.

I. The chord of the fifth and sixth is the first inversion of the dominant seventh, when the lowest note becomes the third of the root. In thorough base it is expressed by a 5 under a 6 (to which the third is understood), and, in practice, the octave of the base note is omitted.

II. The chord of the third and fourth is the second inversion of this harmony, when the lowest note becomes the fifth of the root. It ought, according to its derivation, to be expressed by a 3 under a 4 (to which the sixth is understood); but, as the fourth (or proper root of the harmony) is not pleasing to the ear, it is usually omitted. Thus, the chord appears as a simple sixth, and also as the first inversion of the diatonic dissonant triad, D, F, B.

III. The chord of the second and fourth is the third inversion of this harmony, when the lowest note becomes the discord, and the triad commences on the next degree above. It is expressed by a 2 under a 4 (to which the 6th is understood), sometimes by a 2 alone.

The descent of the part in which the dominant seventh is found, is called its resolution; and, as before observed, that descent is either a tone or a semitone, according to the mode.

This resolution of the seventh occasions two apparent irregularities, viz.

I. The four sounds of the dominant, followed by the three of the triad; in which the last harmony is weakened by two parts becoming unison.

II. The omission of the fifth in the tonic triad, when the antecedent dominant is taken without the octave to the base.

When, however, instead of the octave, the fifth or third of the dominant itself is omitted, the subsequent triad can be taken complete.

Two classes of instances occur, when this general rule of resolving the seventh by the descent of the melody is apparently neglected.

I. When, by licence, the base itself takes the resolution;

Thus, instead of

II. When, after the third inversion, the base, instead of descending a semitone, descends a fourth to the tonic, and another part takes the resolution;

Thus, instead of

Not only the positions of the dominant seventh may be changed, but the inversions also may succeed each other, previous to its resolution. Great care however must be taken, in the arrangement of the parts, to prevent transgressing the rules before given.

I. The first inversion, or chord of the fifth and sixth, resolves by the base ascending a semitone.

II. The second, or chord of third and fourth, resolves by the base descending a tone.

III. The third, or chord of second and fourth, resolves by the base descending a semitone.

The other sevenths when used in sequences, have similar inversions; and the same method of resolution is generally applicable to them all.

As all changes of key are known decidedly by the use of the dominant seventh, the different modulations from both scales will be now explained.

Modulation from the major scale.—I. To the scale of its subdominant. The principal, and most simple change of key, is that which, by adding a minor seventh to the tonic, makes it a new dominant; and hence the subdominant becomes a new tonic. This modulation being continued, forms a circle of descending fifths, or ascending fourths.

II. To the scale of its dominant. The second change is that which, by retaining the octave of the tonic itself, as a seventh, and by making the base ascend a tone in gradation, descends from

the supertonic to the original dominant. This modulation being continued, forms a circle of descending fifths, or ascending fourths.

These two modulations are in continual use; the last, or dominant change, in the former part of a movement; and the first, or subdominant change, towards the conclusion, to restore the original tonic. The subdominant modulation only requires two roots, but that of the dominant requires three.

III. To the scale of the submediant or relative minor. The third change is that in which the base rises from the tonic to the mediant; and, making that a new dominant, by the addition of the seventh, descends to the relative minor tonic.

A similar modulation being continued, forms a circle of keys, in which the major and relative minor succeed each other alternately.

This modulation requires four roots, previous to the alteration of its signature; but the sudden addition of the seventh (especially after the minor tonic), is rather harsh and unexpected.

IV. To the scale of the mediant, or relative minor of the dominant. The fourth change is that which, through a previous modulation into the dominant, makes the original mediant a tonic.

V. To the scale of the supertonic, or relative minor of the subdominant. The fifth change is that which, by making the submediant a dominant, forms a new scale on the supertonic.

Modulation from the minor scale.—I. To the scale of its subdominant. The principal change, like that in the major mode, is made by adding a seventh to the tonic, and sharpening its third, to form a new dominant.

II. To the scale of its dominant. The second change requires an additional harmony (borrowed from the sequence of sevenths) to alter its signature, previous to the use of the new dominant.

III. To the scale of its mediant or relative major. The third change is made by the reversed gradation, or the descent of a tone.

IV. To the scale of its submediant. The fourth change adds a seventh to the mediant, as in the minor modulation before given.

V. To the scale of its seventh. The fifth change, which is very unusual, is made from the original subdominant with a major third.

Modulations are continually formed from one scale to another, by means of tonic harmonies alone; but, in those instances, it is proper to introduce the new dominant as soon as possible, to decide the key; otherwise, the equivocal effect before adduced would frequently occur.

Chap. III.—Of Discords.

Discords are used in harmony, either by transition, suspension, syncopation, or addition.

Discords of transition.—Any note which passes by one degree between the other notes of the triad, forms a discord of transition, and, if found on the weak part of the measure, is termed a passing note.

The notes of irregular transition are found on the strong parts of the measure, and are called by the Germans changing notes.

In the following example, a particular instance of irregular transition occurs.

(Overture to the Messiah.)

The last note but one (viz. the F sharp) is here taken as a discord by irregular transition, which the radical base placed below demonstrates.

In modern music, all the discords of transition may be reduced to appoggiaturas or after-notes.

When the notes of transition are prolonged, they appear as integral parts of the harmony, and are sometimes marked with the figures of thorough base.

Discords of suspension—I. Of the fourth. The fourth, accompanied with the fifth, and eighth, is an appoggiatura, continued in the place of the third, on the strong part of the measure. It is generally prepared, and is resolved by descending one degree.

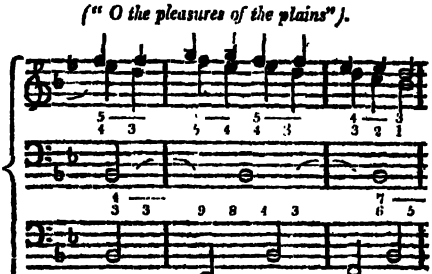
It has two inversions, viz. the second and fifth, which suspends the sixth and the fourth and seventh, which suspends the fourth and sixth, the two inversions of the triad.

II. Of the ninth.—The ninth, accompanied with the third and fifth, is an appoggiatura, continued in the place of the eighth. It is, like the fourth, generally prepared, and always resolved.

The chord of the ninth has two inversions; one figured with a seventh, followed by its resolution the sixth, on the third of the root; the other figured as fifth and sixth, on the fifth of the root.

The following tonic pedal or organ-point is a very important study for the chords of suspension.

("O the pleasures of the plains").



Radical Base.

Of the appoggiaturas of suspension.—Although every note of suspension may be reduced to an appoggiatura, yet, in modern music, some notes are more particularly used as such than others, and differ from those just described by greater freedom in their resolution.

Any part of the dominant seventh may be retained on the tonic base, and afterward proceed according to its proper motion.

The ninth also may resolve by ascending into the tenth, and the sharp seventh (or leading note) must resolve by ascending into the eighth.

In this ascending resolution of the dominant seventh, the figure of the suspended ninth often becomes a second.

In diatonic sequences, as will be shewn hereafter, every note of the scale may bear single or double suspensions.

All these notes are nothing more than the retardation or retention of a sound, longer than the duration of its own root, upon a new radical base.

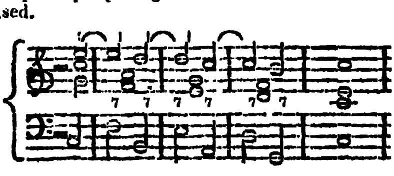
IV. Of anticipation, &c.—When a note is diminished by half its value, and the following degree employed to fill up its time upon the former base, such change is termed anticipation. These anticipated notes are considered wholly as relating to melody, and are not noticed by the figures of thorough base.

The postpositions of Dr. Pepusch are in reality nothing more than irregular suspensions, being the reverse of the anticipation, and used in the following manner:

Many other chords of suspension may be formed, by combining all the preceding in different ways. Hence arise the second and third, the sixth and ninth, &c. &c.; which may be found in Kirnberger, Kollmann, Shield, &c.

The discords of syncopation only differ from those of suspension by constituting part of the radical harmony, and by not being merely appoggiaturas.

The diatonic sequence of sevenths is one of the principal passages in which these discords are used.



The German authors, previous to the writings of Kirnberger (1774), seem to have classed the discords of suspension with those of syncopation; but his arrangement of chords, into essential and accidental, establishes that difference between them which is here adopted.

When any discord which has not been heard in the preceding harmony is united to the perfect triad, it is termed in this work a discord of addition.

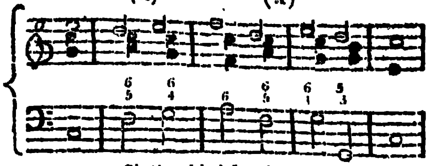
The discords of addition are the seventh, the ninth, both on the dominant; and the sixth on the subdominant; these are particularly useful in distinguishing those two harmonies from that of the tonic.

I. Of the added seventh. The whole second chapter of this part relates to the dominant seventh.

II. Of the added sixth. As the dominant harmony is distinguished from that of the tonic by its added seventh, so the subdominant is distinguished from the tonic, and from the dominant, by its added sixth.

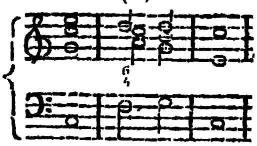
Whenever the melody of a single part (as at A,) or the harmony of the whole (as at B), requires it, the subdominant may have its own sixth (or supertonic of the scale) added to its triad.

(A) (A)



Sixth added for the melody.

(B)



Sixth added for the harmony.

The fifth and sixth on the subdominant may be prepared by the tonic, by the submediant, or by the dominant, as radical bases.

This discord may resolve two ways, viz. into the tonic (on its second inversion), or into the dominant harmony.

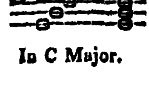
When this harmony appears in the form of a seventh on the supertonic, it frequently constitutes part of the diatonic sequence of sevenths, and, as such, may be accounted radical, like the diminished triad of Kirnberger.

Rameau estimates the root of this harmony by its resolution, calling it D when followed by G, and F when followed by C. Heck considers it as a compound of both the harmonies of D and F. Dr. Boyce (in his MSS.), and with him Dr. Calcott thinks, that the root is decided by the scale of the key in which it is found; thus,

D in A Minor. F in C Major.

Koch, in his Lexicon (art. Verbindungs Accord), has placed his accidental harmonies in a different point of view. He considers them as connecting chords, and seems to agree with Kirnberger, who asserts that, by a species of transition, the harmony of the triad is thus united to another of its inversions.

III. Of the added ninth. When to the chord of the dominant seventh the ninth is also joined, a chord of five sounds is formed. It rises from the root by regular thirds, in the following manner:



In C Major.

In A Minor.

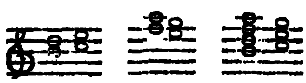
This harmony being generally used in four parts, the radical base is commonly omitted; for the leading note is always sufficiently powerful to guide the ear to its proper root. In this form the two chords have been already described.

The added ninth of the dominant is really the submediant of the scale, or sixth from the tonic; it is consequently major in the major mode, and minor in the minor mode. Thus, although there is but one added seventh, there are two added ninths.

The omission of the root forms a chord of the seventh on the leading note, which may be known from the other sevenths (either of the sequence or of suspension) by its resolution into the tonic. It may sometimes be prepared, but is generally used without preparation.

None of the inversions of this seventh are employed in the major scale, but all are used in that of the minor.

This chord has been considered as a combination of the dominant and subdominant harmonies, since it contains the B and D of the former, and the A and F of the latter, while the resolution of D and F falls on the same note.



Dominant. Subdominant. Union of both.

It is observable, that the above combination of sounds includes every note of the scale, excepting the three notes of the triad on the tonic, and that it also decides the mode of the scale, since the sixth or submediant is part of the chord of the subdominant, which is major or minor, according to the key.

The same chord in the minor mode consists of three minor thirds; and its extreme notes are the sharp seventh and minor sixth of the scale. It is of such great importance in modern music, that it is termed the diminished seventh, or equivocal chord. In the resolution of its parts, it conforms to that of the major chord in the last example.

The radical base of this chord may be found in extreme modulations by two methods.

I. By the major third below the last sharp.

II. By the semitone below the last flat.

When naturals occur, the observations concerning them must be strictly regarded.

This chord is not only considered as a direct harmony, but all its three inversions are occasionally employed.

In those keys where the clef does not agree with the modulation, the second inversion requires a flat or natural under the sharp fourth.

These two chords of the added ninth have been termed chords of major and of minor substitution; since they are considered as derived from the dominant seventh, by substituting the ninth in the place of the eighth.

They are also styled chords of borrowed harmony; since the seventh and ninth are supposed to be derived or borrowed from the subdominant.

All these chords are liable to have any of their sounds suspended on the following tonic harmony; and hence arise many figured bases, too numerous to be inserted within the limits of the present work.

Chap. IV.—Of Cadences.

A cadence in harmony consists of two distinct chords (the last of which is generally accented), and is used to terminate the sections and periods of musical rhythm.

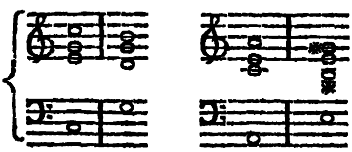
When the bases of both chords are the roots of their respective triads, the cadence is termed radical; and, of these radical cadences, there are four in general use, the perfect, imperfect, false, and mixt: to these may be added the plagal or church cadence, which is only a variation of the imperfect; and the authentic, which is only the ancient term for the perfect.

I. The perfect cadence consists of the dominant harmony, followed by that of the tonic; thus,

In C Major. In A Minor.

The first or leading harmony is always major.

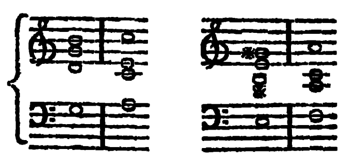
II. The imperfect cadence consists of the tonic, followed by the dominant without its added seventh, and is the former cadence reversed.



In C Major. In A Minor.

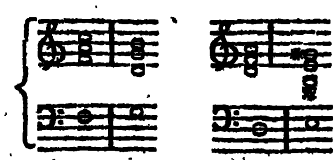
The second or final harmony is always major.

III. The false cadence consists of the dominant, followed by the submediant (in diatonic gradation) taken in the place of the tonic. In the major mode this cadence forms the interval of a tone; in the minor mode, only a semitone; and it is used instead of the perfect cadence, from which it is derived.



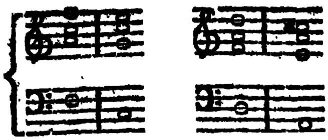
In C Major. In A Minor.

IV. The mixt cadence is the direct gradation of the subdominant to the dominant, and is used instead of the imperfect cadence, from which it is derived.



In C Major. In A Minor.

The plagal cadence only differs from the imperfect as to its place in the scale, being the progression of the subdominant to the tonic. This is used as a final cadence in church music, particularly in the Hallelujah Chorus, Messiah, and in the Coronation Anthem, Zadoc the Priest.



In C Major. In A Minor.

The final chord of this is always major.

The authentic cadence is the same as the perfect, and is only so termed in contradistinction to the plagal.

When the leading harmony of any cadence is not radical, but inverted, the cadence is, in this work, termed medial, and is used to express an incomplete close.

I. Cadence of the leading note.—This is the first inversion of the dominant, and is used instead of the perfect cadence.

II. Cadence of the sharp sixth.—This is the second inversion of the dominant, and is sometimes used as a final cadence on the tonic, as in *Non Nobis Domine;* but more generally on the sixth of the descending scale, when it commonly bears a suspended seventh.

III. Cadence of the major or minor sixth.—This is the first inversion of the mixt cadence, and is chiefly used in the minor mode. It is also liable to the antecedent suspension of the seventh.

These cadences may also become protracted by using other harmonies on the dominant. Thus is formed what Dr. Pepusch calls the grand cadence.

To these may be added those deceptive cadences, which, by varying the final chord, avoid the final close.

Chap. V.—Of Sequences.

Any similar succession of chords in the same scale, ascending or descending diatonically, is, in this work, termed a sequence.

All sequences are particularly distinguished by the irregularity of making the leading note a temporary root, to avoid modulation out of the original scale.

I. *Of dominant sequences.*—The principal descending sequence is that of sevenths; an example of which has been already given, derived from the progression of rising fourths and falling fifths in the dominant motion.

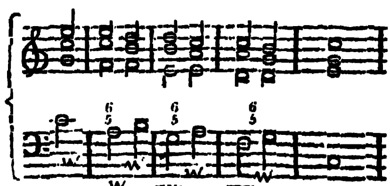
II. *Of mediant sequences.*—The principal ascending sequence is that known by a 5 followed by a 6, on a gradual progression of the diatonic scale. It is derived from the mediant progression.

In this, and the following examples, the directs shew the radical base.

This sequence, like that of sevenths, admits of the leading note as a temporary root; and it seems to have been for the sake of elucidating these passages, that Kirnberger and Kollmann have admitted the diminished triad among the consonant harmonies.

III. *Of inverted sequences.*—The principal inverted sequences are those derived from the sequence of sevenths; and, of these, the most usual is that of a 7, followed by a 6 on the gradual descending progression of the scale.

It is not unusual, in the first inversion of the sequence of sevenths (that of the fifth and sixth), to leave every other harmony as a simple triad, in the following manner:



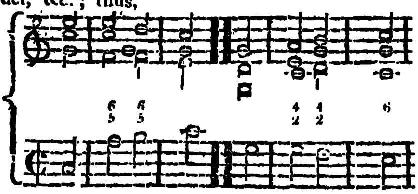
IV. *Of simple sequences.*—A descending scale may also be accompanied by a simple sequence of sixths alone. The theory of this progression is involved in some difficulty; but the uniform practice of authors, both ancient and modern, has established its use.

The same series may take place ascending; and the effect is nearly that of the medial sequence of 5 and 6

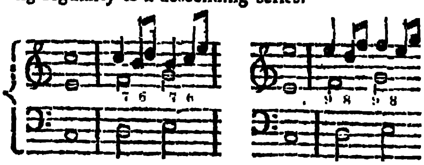
V. *Of compound sequences.*—Compound sequences are those which by employing the chords of suspension, change their harmonies on the alternate base. Of these there are various kinds; one of the principal is that of descending thirds with alternate ninths; thus,

These sequences also may be doubly compounded, and then bear double suspensions.

To these may be added the partial sequences of two similar harmonies, frequently found in Handel, &c.; thus,



VI. *Of irregular sequences.*—It is not unusual to find an ascending scale accompanied with 7 and 6, with 9 and 8, or with their compounds $^{9}_{7}$ and $^{8}_{6}$, which form *irregular* sequences. These chords belong regularly to a descending series.



In these sequences the unaccented harmony must be divided in half, after the resolution of the discord, to prepare the following one, as in the antecedent example; the 7th is then prepared by the 8th, and the 9th by the 10th. There are many other kinds of sequences, but the preceding examples will suffice in this place.

Chap. VI.—Of Licences.

Of pedal harmonies.—When the dominant harmony is taken unprepared upon the tonic base as a holding note, whether preceded by the tonic or by the subdominant harmony, the passage is termed a tonic pedal note or organ point.

In the chord of $^{4}_{2}$ the dominant note itself is generally omitted, for reasons before given; and the chord appears (independent of the holding base) like that of the sharp sixth on the supertonic.

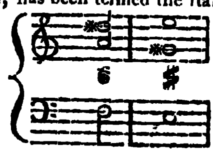
Also when any chords, or sequences, are tal upon the dominant base, as a holding note, a sir lar passage is formed; and the base then also l comes a dominant pedal note or organ point.

Not only the simple dominant, but its co pound derivative, the added ninth, may be tak on a tonic pedal. Hence arises the chord of t sixth and seventh, or the thirteenth of Marpu This is used in the minor mode on the tonic, a sometimes, by extreme licence, on the dominan

Not only these, but any other chords, wheth of suspension, sequence, &c. &c. may be tak on the tonic, or the dominant, as a pedal bas and some instances occur, in which these soun may be retained in a superior part.

Of the extreme sharp sixth.—When, upon tl first inversion of the mixt cadence, the sixth of tl submediant (or fourth of the scale) is accidental sharpened, the chord of the extreme sharp sixt is formed.

This harmony, when accompanied simply l the third, has been termed the Italian sixth.

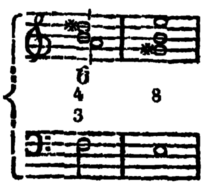


Root B.

By this alteration of the fourth, the species c cadence is changed, from the first inversion of th mixt to the second inversion of the perfect; an it is considered as a licence, because the root bea a flat fifth, while at the same time the third continues major.

The radical base, therefore, of the extrem sharp sixth, is the supertonic of the key; and it fifth is allowed to be defective, that the original minor mode may not be totally destroyed.

When to the simple combination of the Italian sixth the root itself is annexed, a chord of third, fourth, and sixth is formed; and, as this harmony is only found in the theory of Rameau, it may be properly termed the French sixth.



Root B.

A harmony still more remote, but extremely powerful, is formed upon this chord, by inserting the added ninth on the root, as a supposed dominant to the real one.

This occurs with great effect in the writings of Graun, &c. and therefore may be called the German sixth.

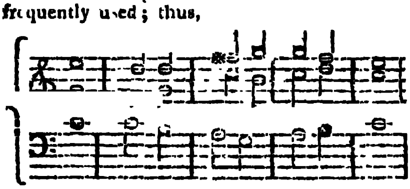
Root B.

It requires, however, a continuation of its third and fifth on the dominant base (as a new fourth and sixth), to prevent the consecutive fifths.

Of partial modulation.—Whenever the dominant and tonic of a new key are employed without the subdominant harmony, such change constitutes a partial modulation.

One change of this kind arises when the seventh of the major mode is flattened, and the modulation returns again through the leading note to the tonic; thus,

Another change towards the dominant is also frequently used; thus,

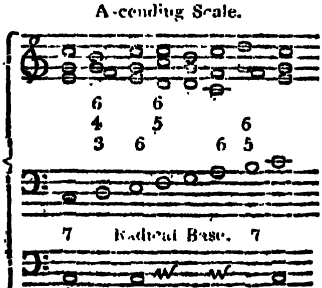


Many other changes occur, to the relative minor (or submediant), to the mediant, to the supertonic, &c. some of which are peculiar to the music of the last forty years.

Of the rule of the octave.—It may at first sight appear singular to class this celebrated progression among musical licences; but, as the descending scale equally includes a partial modulation, and rejects the original subdominant harmony, so essential to the constituent parts of the key, the propriety of the classification must appear obvious.

When a diatonic scale in the base is accompanied with harmony according to this rule, the roots and their inversions are thus intermixed:

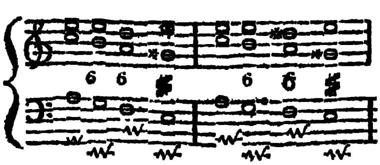
Ascending Scale.



The descending scale makes a partial modulation into the dominant.

In the minor mode, the inversion of the mixt cadence takes place, which, in modern music, is generally varied by the Italian sixth.

The Directs mark the Roots of the Chords.



The remainder of the scale coincides with that of the major mode.

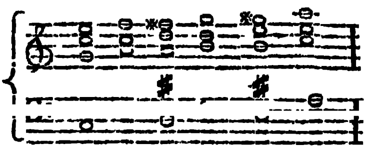
Although this scale is given in the above form by most of the theoretical writers, yet, in practical music, such is the prevalence of partial modulations, varied sequences, &c. that the rule is not often found complete.

Of chromatic modulation.—When the chromatic semitones are introduced between the notes of the diatonic scale, chromatic modulation is formed, in which the key is continually, although partially, changing.

As the diatonic sequence of sevenths is used to avoid modulation, so a chromatic sequence of sevenths consists of dominants alone, and the scale changes at every chord; thus,

This sequence forms a descending chromatic scale.

In a similar manner may be formed an ascending chromatic sequence, derived from that of 5 and 3; thus,



This also makes a partial change at every other harmony.

In modern music, a species of chromatic transition is employed, in which the semitones occur, not as parts of the radical harmony, but as appoggiaturas, after-notes, or acciaccaturas.

The two following examples, from the celebrated opera of Mozart, the Zauberflöte, are instances of chromatic appoggiaturas.

("Wie stark its nicht").

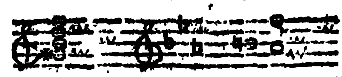
("Schnelle Fusse").

The acciaccatura, or half beat, is also used with great effect in a terzett, from the same piece.

("Seyd uns zum zweytenmal").

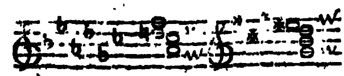
Of enharmonic modulation.—The last and most difficult branch of harmony is that which arises from the sudden change of key made by the enharmonic diesis.

When any one of the sounds of the equivocal chord is called by a new name, and placed on a new degree, the root, scale, and signature, all change at once.



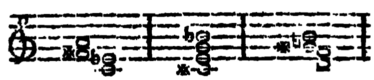
Root E, Key A Minor. Root G, Key C Minor.

As this harmony consists of four sounds, each of which may be altered by the diesis, the two following modulations arise from the same chord.



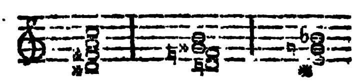
Root B flat, Key E flat Minor. Root C sharp, Key F sharp Minor.

As the chromatic octave upon keyed instruments consists of twelve different sounds (exclusive of the diatonic eighth or replicate of the first), there are but three different chords, in respect of the keys themselves, on the key-board. These, in their simplest forms, are the added ninths of D, A, and E, dominants of their respective minors.



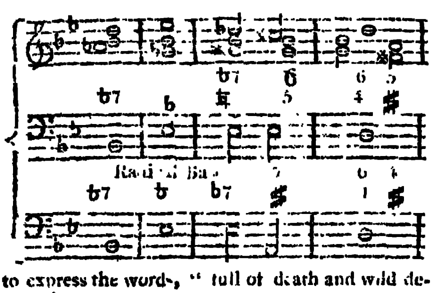
Each of these chords, by the use of the diesis, may change into three other harmonies; and thus an immediate step to any one of the twelve minor modes may be gained.

These chords may also, under certain limitations, succeed each other chromatically, descending or ascending.



Root B Root E Root A
(Descending.)

The last and most unusual species of enharmonic modulation, is that which changes the dominant seventh into the German sixth. A remarkable instance occurs in Handel's Solomon, at the chorus, "Draw the tear from hopeless love;" thus.



to express the words, "full of death and wild despair."

For the fourth general topic usually considered in treatises of music, that is rhythm, see the article RHYTHM in this work. See also part ii. of Dr. Calcott's valuable Musical Grammar, which may likewise be advantageously consulted, for many other examples in illustration of the precepts and observations here given. Those who wish to study the mathematical and philosophical theory of musical sounds are referred to Gregory's Translation of Hauy's Natural Philosophy, vol i. p. 311—340. See also the articles ÆOLUS'S HARP, *Bass thorough*, CHORDS, GENERATOR HARMONY, KEY, &c. in their proper places in this dictionary.

The plates numbered 116, 117, 118, and 119, exhibit interesting specimens of English, Scotch, and German music. For many highly admirable specimens of Welsh and Irish music we must refer the curious reader to the collections of Welsh and Irish melodies recently published.

MU'SICAL. *a.* (*musical*, French, from *music.*) 1. Harmonious; melodious; sweet sounding (*Milton*). 2. Belonging to music (*Addison*).

MU'SICALLY. *ad.* (from *musical.*) Harmoniously; with sweet sound (*Addison*).

MU'SICALNESS. *s.* (from *musical.*) Harmony.

MUSI'CIAN. *s.* (*musicien*, French.) One skilled in harmony; one who performs upon instruments of music (*Bacon*).

MUSK. An odoriferous substance of a peculiar nature, secreted into a bag, situated near the umbilical region of the moschus moschifer of Linnéus, a ruminating animal, resembling the antelope. (See MOSCHUS.) This bag, according to Newmann, has no external opening, like that of the civet cat, whence musk is not to be gotten till after the death of the animal.

In the article alluded to above, we have observed that in commerce two sorts of musk are distinguished, the Tonquin or Indian, and the Muscovy or Persian. Musk is either of a dark brown or rusty reddish colour: sometimes clothed like coagulated blood. To the touch it is unctuous, and on drying becomes pulverizable. It has a bitterish savour, and its aroma is peculiarly strong and aromatic, disagreeable if too concentrated, but when largely diluted with other matters, or greatly extended in the atmosphere, it becomes a pleasant perfume. From its aroma being remarkably diffusive and tenacious, every thing in its vicinity becomes thoroughly infected with it, and retains it a long time. Water extracts two-fifths of it by distillation; and is greatly with its aroma and savour: alkohol takes up one-third of it, but retains little or nothing of its aroma. Nitric and sulphuric acids totally dissolve it, the first destroying the whole, the second the greater part of its aroma.

Soda extracts from it the smell of ammonia, when these two substances are rubbed together. Oils have no action upon it. Cast on red-hot coals, it emits the same fetid smell as urine. On distillation, Newmann obtained the same products as from other animal substances, viz. an empyreumatic oil, a volatile spirit and salt.

By impregnating the waters and spirits distilled from odoriferous vegetables with a minute portion of musk, their fragrance is considerably improved, without receiving any of its own peculiar aroma.

MUSK CAVY. MUSK-RAT. See MUS.

MUSK CRANESBILL. See GERANIUM MOSCHATUM.

MUSK OX. See BOS.

MU'SKET. *s.* (*musquet*, French.) 1. A soldier's hand-gun (*Bacon*). 2. A male hawk of a small kind (*Shakspeare*).

MUSKETE'ER. *s.* (from *musket.*) A soldier whose weapon is his musket (*Clarend.*)

MUSKETO'ON. *s.* (*musqueton*, French.) A blunderbuss; a short gun of a large bore.

MU'SKINESS. *s.* (from *musk.*) The scent of musk.

MUSLIN, a fine thin sort of cotton-cloth, which bears a downy knap on its surface. There are several sorts of muslins brought from the East Indies, and more particularly from Bengal; such as doreas, betelles, mûlmuls, tanjeebs, &c.

MUSQUITO, in entomology. See CULEX.

MU'SROL. *s.* (*muserole*, French.) The noseband of a horse's bridle (*Bailey*).

MUSS. *s.* A scramble (*Shakspeare*).

MUSSÆNDA, in botany, a genus of the class pentandria, order monogynia. Corol funnel-form; stigmas two, thickish, berry oblong, inferior; seeds disposed in four rows. Three species, natives of India or China, climbing or upright shrubs.

MUSSINIA, in botany, a genus of the class syngenesia, order polygamia frustranea. Receptacle villous; down simple; floret of the ray ligulate; calyx one-leafed, cylindrical; toothed. Six species, all Cape plants.

MUSSELBURG, a seaport in Edinburghshire, on the frith of Forth, at the mouth of the river Esk. Here a victory was obtained by the English over the Scots in the reign of Edward VI. It is six miles E. of Edinburgh. Lon 3.5 W. Lat. 56. 0 N.

MUSSITA'TION. *s.* (*mussito*, Lat.) Murmur; grumble.

MUSSULMAN, or MUSULMAN, a title by which the Mahometans distinguish themselves; signifying, in the Turkish language, true believer, or orthodox. (See MAHOMETANISM) In Arabic the word is written Moslem, Mosleman, or Mosolman. The appellation was first given to the Saracens, as is observed by Leunclavius.

MUSWELL HILL, a village in Middlesex, five miles N. of London. It takes its name from a famous well on the hill, which belonged to the fraternity of St. John of Jerusalem, in Clerkenwell; and as this was deemed a miraculous cure for all scrophulous and cutaneous disorders, they here built a chapel, with an image of our Lady of Muswell, to which there was a great resort of patients. This well still belongs to the parish of Clerkenwell.

MUST. *verb imperfect.* (*mussen*, Dutch.) To be obliged; to be by necessity. It is only used before a verb. *Must* is of all persons and tenses, and used of persons and things.

MUST. *s.* (*mustum*, Latin.) New wine; new wort (*Dryden*).

To MUST. *v. a.* (*mws*, Welsh, stinking.) To mould: to make mouldy (*Mortimer*).

To MUST *v. n.* To grow mouldy

MUSTA'CHES. *s.* (*mustaches*, French.) Whiskers; hair on the upper lip (*Spenser*).

MUSTARD, in botany. See SINAPIS.

MUSTELA. Otter. Ferret. Stoat. In zoology, a genus of the class mammalia, order feræ. Fore-teeth, upper six, erect, acuter, distinct; lower six obtuser, crowded, two placed within; tongue smooth Twenty-eight species, scattered over the globe, six of them common to our own country. In many respects the otter-tribe of this genus very nearly resembles the weesel tribe; the body in both being long, of the same thickness, feet short, hair shining, claws immoveable, both burrow in the ground, and prowl and prey by night: but the otters live mostly in the water, swim on the surface, and under, feed chiefly on fishes, do not climb, or leap with the body curved and tail stretched out like the weesels; head larger and thicker, tongue strewed with soft prickles: otters have five grinders in each jaw, on each side; weesels have four, five, or six. The genus may be subdivided as follows.

A. Hind feet palmate. Otters.

B. Feet cleft. Weesels.

The following species are the chief.

1. M. lutra. Common or greater otter. Short ears, eyes placed near the nose, thick lips. and large whiskers. Colour of the whole body deep brown, except two small spots on each side of the nose, and another beneath the chin: the throat and breast ash-coloured: legs short and thick, loosely joined to the body; capable of being brought on a line with the body, and of performing the part of fins: each toe connected to the other by a broad strong web.

Its usual length is twenty-three inches; its tail measures sixteen: the weight of the male from eighteen to twenty six pounds; of the female, from thirteen to twenty-two.

It inhabits all parts of Europe, the north and north-east of Asia, as far as Kamtschatka and in the easternmost of the Fox islands: but abounds in North America, particularly in Canada, where the most valuable furs of this kind are produced. It dwells on the banks of rivers, and burrows, forming the entrance of its hole beneath the water, whence it works upward, making a small orifice or air-hole in the midst of some bush. It is a cleanly animal, and deposits its excrements only in one place: swims and dives with great ease: is very destructive to fishes; but when these fail, makes excursions on land, and preys on lambs and poultry: is said to hunt its prey against the stream, that it may return with greater ease with its booty. It frequents not only fresh waters, but also sometimes ventures out to sea, though it never goes far from the shore in quest of prey. It frequently gives a sort of loud whistle, by way of signal to another. It is a fierce animal, and its bite dangerous; yet it is capable of being tamed, and made to follow its master like a dog, and even to fish for him, and to return with its prey. These animals sometimes breed in sinks and drains. They dread neither cold nor moisture. The female comes in season in winter, and brings forth in the month of March four or five young ones at a time. Contrary to what happens to most other animals, the young otter is not so handsome as the old.

Mr Pennant conjectures that the latax of Aristotle was a large variety of this species.

2. M. lutreola. Lesser otter. Resembling the preceding, but only one-third of its size. Feet very hairy, toes equal, mouth white; tail dusky, broad, darker towards the end. Inhabits marshy places in Germany, Poland, Finland, Russia, and Siberia: feeds on fishes and frogs; fetid; fur valuable: caught with dogs and in traps.

3. M. minx. Mink. Body entirely deep chesnut. Inhabits North America, on the banks of rivers; feeds on fishes, birds, mice; sometimes haunts farm-yards.

4. M lutris. Sea otter. Hind-feet hairy; tail a fourth part as long as the body. Another variety black, with a yellow spot under the throat. Nose black; upper jaw larger and broader than the under; whiskers white; irids hazel; ears small erect, conic; skin thick; hair thick and long, excessively black and glossy. beneath a soft down: colour sometimes varies to silvery: legs thick and short: toes covered with hair, and joined by a web: hind feet exactly like those of a seal, and have a membrane skirting the outside of the exterior toe, like that of a goose. Length of the body about three feet; of the tail, thirteen inches and a half: tail flat, fullest of hair in the middle. and sharp pointed. The biggest of these animals weigh seventy or eighty pounds. They are found in great abundance in Bering's island, and the Fox islands; they are harmless and inoffensive creatures, most affectionate to their young: they will pine to death for the loss of them, and die on the very spot where they have been taken from them. Before the young can swim, they carry them in their paws, lying in the water on their backs. They are swift in running, and very sportive: embrace, and even kiss each other. They swim often on their backs, on their sides, and even in a perpendicular posture. They inhabit such shallows as abound with sea-weeds, and feed on lobsters, fishes, sepiæ, and shell-fishes. They breed only once a year, bring but one at a time, and suckle it for a year: are dull sighted, but of a very quick scent. They are hunted for their skins, which are of great value; and are sold to the Chinese for seventy or a hundred rubles a piece. Each skin weighs three pounds and a half. The young are reckoned such delicate meat, that their flesh is scarcely to be distinguished from that of a sucking lamb.

5 M. vulgaris. Common weesel. Body tawny-brown, beneath white; tail colour of the body. Another variety with the body white; tip of the tail with a few black hairs. Found in our own country; and inhabits the temperate and cold regions of Europe, Asia, and America: in Russia, becomes white in winter; half the size of the ermine; eats fishes, flesh, mice, eggs, and mushrooms, but no other vegetables; preys by night; gets into the holes of mice and devours them, leaving the teeth only; fetid; dirty; drinks often; cunning; continually looks about; is not easily destroyed by a cat; when terrified becomes epileptic; playful when tamed; brings from six to eight young.

6. M. Canadensis. Pekan. Body blackish, tawny; on the breast a white spot. Inhabits Canada; about two feet long; tail ten inches.

7. M. foina. Martlett. Martin. Body blackish; tawny; throat and breast white; belly deep-brown; feet hairy; claws white; length eighteen inches; tail ten. Inhabits most parts of southern Europe, and is a native of England; preys by night on poultry, eggs, frogs, birds, and ripe fruit; an enemy to cats; easily tamed when young; female brings from three to seven young, and breeds in hollow trees.

8. M. zebellina. Sable. Body dark-tawny; forehead white; throat cinereous.

B. Another variety snowy white.

C. A third variety with a collar of white round the neck. Resembles the martin; head longer; ears longer; yellow at the margin: mouth whiskered. Inhabits the northern parts of Asia and America, Siberia, Kamschatka, the Kurile islands: sleeps by day; preys by night on smaller weesels, squirrels, and hares; in winter on birds, particularly partridges; in autumn on berries: attacks cats; gravid three mouths; brings from three to five young; fur very precious.

In the more barbarous times of the Russian empire the hunting of these animals was the employment, or rather the task, of those unhappy exiles that were sent into Siberia. As that country is now become more populous, the sables have, in a great measure, quitted it, and retired further north and east, to live in desert forests and mountains. They usually reside on the banks of rivers, or on the little islands in them.

At present the sable hunters form themselves into parties or troops, from five to forty each: the last subdivide into lesser parties, and each chooses a leader; but there is one commander in chief that directs the whole. A small covered boat is prepared for each party, laden with provision, a dog and a net for every two men, and a vessel to bake their bread in. Each party has also an interpreter for the country they intend to penetrate. Every party then sets out, according to the course their leader points out. They ascend the rivers, drawing up their boats, till they arrive in the hunting country. There they stop, build huts, and wait till the waters are frozen, and the season commences. Before they begin the chase, their leader assembles them; they join in a prayer to the Almighty for success, and then separate. The first sable each party takes is called God's sable, and is dedicated to the church.

They then penetrate into the woods, and mark the trees as they advance, that they may know their way back. In their hunting-quarters they form huts of trees, and bank up the snow around them. Near these they lay their traps; then advance farther, and lay more traps; still building new huts in every quarter, and returning successfully to every old one, to visit the traps, and to take out the game, and to skin it, which none but the chief of the party must do. During this time they are supplied with provisions by persons who are employed to bring it on sledges from the places on their route, where they are obliged to form magazines. The traps are a sort of pit-falls, with a loose board placed over each, baited with fish or flesh. When sables grow scarce, the hunters trace them on the new fallen snow to their holes, place their nets at the entrance, and sometimes wait, watching, two or three days, for the coming out of the animal. It has happened that these poor people have, by the failure of their provisions, been so pinched with hunger, that, to prevent the cravings of appetite, they have been reduced to take two thin boards, one of which they apply to the pit of the stomach, the other to the back, drawing them tight together by cords placed at the ends. Such, says Mr. Pennant, are the hardships our fellow-creatures undergo, to supply the wantonness of luxury!

The season of chase being finished, the hunters re-assemble, report to their leader the number of sables each has taken, make complaints of offenders against their regulations, punish delinquents, and share the booty. They then continue at the

head-quarters till the rivers are clear of ice; when they return home, and give to every church the dedicated furs.

The price of these furs varies from one to ten pounds sterling, and above. Fine and middling skins are sold without the bellies; the coarse ones with them. The finest sables are sold in pairs perfectly similar; and such pairs are dearer than single ones of the same goodness; for the Russians want those in pairs for facing caps, cloaks, and tippets. The blackest are reputed the best. Sables are in season from November to February: those caught at any other time of the year are short-haired. The hair of sables differs in length and quality: the long hairs, which reach far beyond the inferior ones, are called os. The more a skin has of such long hairs, and the blacker they are, the more valuable is the fur. The very best have no other but those long black hairs. Below the long hairs there are, in the greater part of sable furs, some shorter, called podosie or under os. The more podosie a fur has, the less valuable it is. Between the os and podosie there is a low woolly kind of hair called podsada. The more podsada a fur has, the less valuable it is reputed; for the long hair will, in that case, take no other direction than the natural one: but the character of sables is, that notwithstanding the hair lies from the head towards the tail, yet it will lie in any direction you strike your hand over it. Beside various other particulars respecting the fur, the furriers attend much to the size, always preferring, *cæteris paribus*, the biggest, and those that have the greatest gloss. The gloss vanishes in old furs: the fresh ones have what dealers in furs call a bloomy appearance; the old ones are said to have done blooming. The dyed sables always lose their gloss, and become less uniform, whether the lower hairs have taken the dye or not; and the hairs are commonly twisted or crisped, and not so straight as the natural ones. Some fumigate the skins, to make them look blacker; but the smell, and the crisped condition of the long hair, betrays the cheat: but dying and fumigating are both detected by rubbing the fur with a moist linen cloth, which grows black in such cases. The Chinese, however, have a way of dying the sables, so that the colour not only lasts, which is more than the Russian cheats can effect; but the fur keeps its gloss, so that the fraud can only be detected by the crisped hairs.

The country about the river Ud affords sometimes sables, of which one is often sold for twelve or fourteen pounds sterling. The bellies of sables, which are sold in pairs, are about two fingers breadth, and are, like the skins, tied together in parcels of forty each. One of these parcels sells from one to two pounds sterling: tails are sold by the hundred; the very best furs must have their tails, but ordinary ones are often cropped. A hundred sells for from four to eight pounds. White sables are rare: they are not common merchandize, but bought only as curiosities. Some are yellowish, and are bleached in the spring on the snow. The common sables are scarcely any thing better in hair and colour than the martin.

The sable is also found in North America. The Russians have often discovered the skins mixed with those of martins in the fur dresses, which they get from the Americans by way of exchange. Their fur is more glossy than that of the Siberian sable, and of a bright chesnut colour, but of a coarser quality.

The length of the American sable is about twenty inches; the trunk of the tail is only five; but from the rump to the end of the hairs eight. His ears are more pointed than those of the Asiatic sable: its feet are large and hairy, both above and below: it has five toes, with white claws on each foot. The colour of its head and ears is whitish: its whiskers are short and black; its whole body of a light tawny; its feet are brown.

This species and one or two of the ensuing are erroneously referred by some naturalists to the genus VIVERRA, which see.

9. M. putorius. Pole-cat. Body blackish-yellow; mouth and ears white. Differs from the martin in having the head thicker; tail shorter; in the deserts of Russia sometimes found white; male yellowish, with a whitish mouth; female paler. Inhabits most parts of Europe and Asiatic Russia: dwells in stony places; frequents stables, granaries, houses, hollow trees, and shallow burrows; sleeps by day, wanders by night in search of rabbits, mice, moles, poultry and small birds, in the winter frogs and fishes; steals eggs; robs bee-hives; emits from the arms when agitated a most fetid vapour.

10. M. furo. Ferret. Eyes red, fiery: less than the polecat; head narrower; snout sharper; body longer, slenderer; colour pale-yellow. Inhabits Africa; tamed in Europe to catch rabbits; procreates twice a year; gravid six weeks; brings from six to eight, rarely nine, young; very fetid.

11. M. erminea. Tail black at the tip. Two varieties.

α. Body with a red tinge. Stoat.

β. Body white; tail blackish at the tip. Ermine.

The body of this species is ten inches long; the hair short, not so shining as in the martin; in northern climates becomes white, except the outer half of the tail, which remains black. Inhabits Europe, the cold parts of America, Asia, China; lives in heaps of stones, banks of rivers, hollow trees, and forests, especially of beech; preys on squirrels, mice, and small animals: the fur of the ermine is very valuable. See ERMINE; as also Nat. Hist. Pl. CLIX.

To MU'STER. *v. n.* To assemble in order to form an army (*Blackmore*).

To MU'STER. *v. a.* (*mousteren*, Dutch.) To bring together; to form into an army (*Locke*).

MU'STER. *s.* (from the verb.) 1. A review of a body of forces (*Ben Jonson*). 2. A register of forces mustered (*South*). 3. A collection: as, *a* muster *of peacocks*. 4. *To pass* muster. To be allowed.

MU'STERBOOK. *s.* (*muster* and *book.*) A book in which the forces are registered (*Shakspeare*).

MU'STERMASTER. *s.* One who superintends the muster to prevent frauds (*Knolles*).

MUSTER-ROLL, a specific list of the officers and men in every regiment, troop, or company, which is delivered to the inspecting field officer, muster-master, regimental or district paymaster (as the case may be), whereby they are paid, and their condition is known. The names of the officers are inscribed according to rank, those of the men in alphabetical succession. Adjutants of regiments make out the

muster-rolls, and when the list is called over, every individual must answer to his name. Every muster-roll must be signed by the colonel or commanding officer, the paymaster and adjutant of each regiment, troop, or company; it must likewise be sworn to by the muster-master or paymaster (as the case may be), before a justice of the peace, previous to its being transmitted to government.

MU'STILY. *ad.* (from *musty.*) Mouldily.

MU'STINESS. *s.* (from *musty.*) Mould; damp foulness (*Evelyn*).

MU'STY. *a.* (from *must.*) 1. Mouldy; spoiled with damp; moist and fetid (*Bacon*). 2. Stale; spoiled with age (*Shakspeare*). 3. Vapid with fetidness (*Pope*). 4. Dull; heavy; wanting activity; wanting practice in the occurrences of life (*Addison*).

MUTABI'LITY. *s.* (*mutabilité*, French.) 1. Changeableness, not continuance in the same state (*Stillingfleet*). 2. Inconstancy; change of mind (*Shakspeare*).

MU'TABLE. *a.* (*mutabilis*, Latin.) 1. Subject to change; alterable (*South*). 2. Inconstant; unsettled (*Milton*).

MU'TABLENESS. *s.* (from *mutable.*) Changeableness; uncertainty; instability.

MUTA'TION. *s.* (*mutation*, French; *mutatio*, Latin.) Change; alteration (*Bacon*).

MUTE. *a.* (*muet*, Fr. *mutus*, Lat.) Silent; not vocal; not having the use of voice (*Dryden*).

MUTE. In case any person refuses to plead to an indictment for felony, &c. he is now by stat. 12 Geo. III. c. 20, to be considered as pleading guilty, and to be punished as upon confession. Formerly a plea was extorted from him by a process, which was called the *peine forte et dure*, and which has been justly considered as inhuman and disgusting.

MUTE is also a sporting term, applied to a hound when he pursues his game by the scent, without giving tongue. As some are by much too free, and give tongue too hastily, when in a state of uncertainty, acquiring thereby the denomination of babblers, so there are others equally tardy in proclaiming the discovery. Hounds of each description are considered injurious to the discipline and desirable excellence of the pack, and are generally rejected as soon as their imperfections are known, and confirmed.

MUTE, in a general sense, signifies a person that cannot speak, or has not the use of speech.

MUTE, in grammar, a letter which yields no sound without the addition of a vowel. The simple consonants are ordinarily distinguished into mutes and liquids, or semi vowels. (See the articles CONSONANT, LIQUID, &c.) The mutes in the Greek alphabet are nine, three of which, viz. π, κ, τ, are termed *tenues*: three, β, γ, δ, termed *mediæ*; and three, φ, χ, θ, termed *aspirates*. (See the article ASPIRATE, &c.) The mutes of the Latin alphabet are also nine, viz. B, C, D, G, I, K, P, Q, T.

To MUTE. *v. n.* (*mutir*, French.) To dung as birds (*Tobit*).

MU'TELY. *ad.* (from *mute.*) Silently; not vocally (*Milton*).

MUTIC. In botany, awnless. Opposed to aristate, awned, in Philos. Botan. Mutica gluma; acumine destituta. Without any point at the end. Delin. Pl. In this sense we have arista mutica: which can mean only blunt, or having no acumen or sharp point. This term is applied to the calyx in serratula; and to the anthers in erica herbacea.

MUTILATE. Mutilus flos. In botany, a mutilated flower. Not producing a corol, when it ought regularly to do it. This defect is commonly owing to a want of sufficient heat, either from climate or situation; sometimes it is the effect of culture.

To MU'TILATE. *v. a.* (*mutiler*, Fr.) To deprive of some essential part (*Addison*).

MUTILA'TION. *s.* (*mutilation*, Fr.) Deprivation of a limb, or any essential part (*Clarendon*).

MUTILLA, a genus of insects, of the order hymenoptera: the generic character is, antennas filiform; feelers four; the articulations obconic, seated on the tip of the lip; jaw membranaceous at the tip, lip projecting obconic; wings in most species obconic; body pubescent, thorax retuse behind; sting pungent, concealed. The M. helvola inhabits the Cape of Good Hope. There are thirty-eight species.

MUTINA, the ancient name of Modena.

MU'TINE. *s.* (*mutin*, Fr.) A mutineer (*Shakspeare*).

MUTINE'ER. *s.* (from *mutin*, French.) A mover of sedition; an opposer of lawful authority (*Dryden*).

MU'TINOUS. *a.* (*mutine*, French.) Seditious; busy in insurrection; turbulent (*Wal.*).

MU'TINOUSLY. *ad.* (from *mutinous.*) Seditiously; turbulently (*Sidney*).

MU'TINOUSNESS. *s.* (from *mutinous.*) Seditiousness; turbulence.

To MU'TINY. *v. n.* (*mutiner*, Fr.) To rise against authority; to make insurrection; to move sedition (*South*).

MU'TINY. *s.* (from the verb.) Insurrection; sedition (*Temple*).

Any officer or soldier who shall presume to use traiterous or disrespectful words against the sacred person of his majesty, or any of the royal family, is guilty of mutiny.

Any officer or soldier who shall behave himself with contempt or disrespect towards the general or other commander in chief of our forces, or shall speak words tending to their hurt or dishonour, is guilty of mutiny.

Any officer or soldier who shall begin, excite, cause, or join in, any mutiny or sedition, in the troop or company, or regiment, to which he belongs, or in any other troop or company in our service, or on any party, post, detachment, or guard, on any pretence whatsoever, is guilty of mutiny.

Any officer or soldier who, being present at any mutiny or sedition, does not use his utmost endeavours to suppress the same, or coming to the knowledge of any mutiny, or intended mutiny, does not without delay give informa-

tion to his commanding officer, is guilty of mutiny.

Any officer or soldier who shall strike his superior officer, or draw, or offer to draw, or shall lift up any weapon, or offer any violence against him, being in the execution of his office, on any pretence whatsoever, or shall disobey any lawful command of his superior officer, is guilty of mutiny.

MUTISIA, in botany, a genus of the class syngenesia, order polygamia superflua. Receptacle naked; down feathery; calyx cylindrical, imbricate; florets of the disk three-cleft. Eleven species, natives of Chili and Peru; most of them climbing plants, some with pinnate, others with simple leaves.

MUTITAS. (*mutitas*, from *mutus*, dumb.) Dumbness. A genus of disease in the class locales and order dyscinesiæ of Cullen: containing three species, viz. 1. Mutitas organica, as happens when the tongue is removed or injured. 2. Mutitas atonica, arising from an affection of the nerves of the organ. 3. Mutitas surdorum, depending upon being born deaf.

MUTIUS (Cælius), first named Codrus, and afterwards Scævola, an illustrious Roman, who distinguished himself greatly in the war with Porsenna. When that prince besieged Rome, Mutius entered his camp in order to assassinate him, but, by mistake, stabbed one of his attendants On being seized and brought before Porsenna, he said that he was one of 300 youths who had engaged, by oath, to take away his life. He added, "This hand, which has missed its purpose, ought to suffer." Then, without hesitation, he thrust it into some coals which were burning on the altar, and suffered it to be consumed. Porsenna, struck with this intrepidity, made peace with the Romans. The name of Scævola, which means left-handed, was afterwards annexed to all of this family.

MUTSCHEN, a town of Upper Saxony, in the circle of Leipsic. In the neighbourhood is found a species of crystal, to which is given the name of Mutschen diamond. It is 20 miles E. of Leipsic. Lon. 12. 50 E. Lat. 51. 14 N.

To MUTTER. *v. n.* (*mutire*, Latin.) To grumble; to murmur (*Dryden*).

To MU'TTER. *v. a.* To utter with imperfect articulation; to grumble forth (*Creech*).

MU'TTER. *s.* (from the verb.) Murmur; obscure utterance (*Milton*).

MU'TTERER. *s.* (from *mutter.*) Grumbler; murmurer.

MU'TTERINGLY. *ad.* (from *muttering.*) With a low voice.

MUTTON. *s.* (*mouton*, French.) 1. The flesh of sheep dressed for food (*Swift*). 2. A sheep: in ludicrous language (*Hayward*).

MUTTONFIST. *s.* (*mutton* and *fist.*) A hand large and red (*Dryden*).

MU'TUAL. *a.* (*mutuel*, French.) Reciprocal; each acting in return or correspondence to the other (*Pope*).

MU'TUALLY. *ad.* (from *mutual.*) Reciprocally; in return (*Newton*).

MUTUA'LITY. *s.* (from *mutual.*) Reciprocation (*Shakspeare*).

MUTULE, in architecture, a kind of square modillion, set under the corniche of the Doric order. The only difference between the mutule and modillion consists in this, that the former is used in speaking of the Doric order, and the latter in the Corinthian.

MU'ZZLE. *s.* (*museau*, French.) 1. The mouth of any thing (*Sidney*). 2. A fastening for the mouth, which hinders to bite (*Dry.*).

To MUZZLE. *v. n.* To bring the mouth near (*L'Estrange*).

To MUZZLE. *v. a.* 1. To bind the mouth (*Dryden*). 2. To fondle with the mouth close (*L'Estr.*). 3. To restrain from hurt (*Shakspeare*).

MY. *pronoun possessive.* Belonging to me.

MYA. Gaper. In zoology, a genus of the class vermes, order testacea. Animal an ascidia: shell bivalve, generally gaping at one end: hinge with broad, thick, strong teeth, seldom more than one, and not inserted into the opposite valve. Twenty-six species, scattered through the seas and rivers of the globe. Six common to our own coasts. The animals of this genus perforate into the sand and clay at the bottom of the sea, or beds of rivers, burying themselves or their shells wholly or in part. The following are the chief:—

1. M. declivis. Shell brittle, semitransparent, sloping downwards near the open end: the hinge slightly prominent. Found about the Hebrides: the fish in great esteem as a food among the inhabitants.

2. M. pictorum. Painter's mya. Shell ovate; with a single, longitudinal, crenulate tooth in one hinge, and two in the other. There are six or seven varieties of this species: some of them are found in the fresh waters of Britain and other parts of Europe, some in Barbary, some in Tranquebar. The shell is commonly used to put water colours in, whence its specific name. One inch and three quarters long, three and a half broad; covered with a brownish or blackish coat, and under this yellowish or greenish, with green rays; within smooth and clay-colour; very thin and brittle, and does not gape at either end.

3. M. margaritifera. Pearl mya. Shell ovate, a little contracted in the middle of the thinner margin; primary tooth of the hinge conic; protuberant parts over the hinge decorticated. Inhabits most of the arctic circle, and is generally found in mountainous rivers and about cateracts; about five inches broad and two and half long: shell thick, coarse, opake, transversely wrinkled, black on the outside, and often corroded by worms; hinge without lateral teeth, the primary tooth being received into a broad cleft tooth of the opposite hinge. This shell is celebrated for producing large quantities of mother of pearl and pearl, these latter being a disease of the fish analogous to the stone in the human body. The river Con-

way in Wales was formerly famous for producing pearls of great size and value.

From observations on the growth of these shells and the number of their annual laminæ or scales, it has been supposed that this fish will attain a great age, and that fifty or sixty years is a very moderate computation. Linnéus, however, appears to have made a remarkable discovery upon this subject; to have shewn that the fish will bear removing well, and that by a particular process it may be put into a state of producing pearls at our pleasure in the reservoirs to which it is transferred, the old pearls being removed to make way for the formation of new ones: we are not, however, in possession of the process which he pursued to accomplish this desideratum.

MYACANTHA. In botany. (*myacantha*, μυακανθα; from μυς, a mouse, and ακανθα, a thorn, so called because its prickly leaves are used to cover whatever is intended to be preserved from mice.) Butcher's broom. See RUSCUS.

MYAGRUM. Gold of pleasure. In botany, a genus of the class tetradynamia, order siliculosa. Silicle inversely heart-shaped, with concave valves, and terminated by a conic style; the cell mostly one-seeded. Ten species, chiefly natives of the warmer regions of Europe. Of these, M. perenne is the most common, a native of Germany, with two-jointed, one-seeded silicles; leaves outwardly sinuate, denticulate: stem branched, diffuse, rough; flowers yellow.

MYCALE, a city and mountain of Caria; also a promontory of Asia opposite Samos, celebrated for a battle which was fought there between the Greeks and Persians about the year of Rome 275. The Persians were about 100,000 men, who had just returned from the unsuccessful expedition of Xerxes in Greece. They had drawn their ships to the shore, and fortified themselves strongly, as if determined to support a siege. They suffered the Greeks to disembark from their fleet without the least molestation, and were soon obliged to give way before the cool and resolute intrepidity of an inferior number of men. The Greeks obtained a complete victory, slaughtered some thousands of the enemy, burned their camp, and sailed back to Samos with an immense booty, in which were 70 chests of money.

MYCETOPHAGUS, in zoology, a tribe of coleopterous insects of the Fabrician system, belonging to the genus SILPHA, which see.

MYCONE, an island of the Archipelago, 30 miles in circumference. The harbour is very open, and deep enough for the largest ships, where they may ride secure from the N. wind. The soil is dry, and the mountains are of a great height. Water is very scarce in summer; but in the town is a large well, the only one in the island. Here are plenty of partridges, quails, woodcocks, turtledoves, rabbits, and wheatears; also excellent grapes and figs. Almost all the inhabitants are Greeks, who have 50 churches in all; but many are chapels, and some monasteries. Lon. 25. 51 E. Lat. 37. 28 N.

MYCTERIA. Jabiru. In zoology, a genus of the class aves, order grallæ. Bill a little bending upwards, sharp-pointed, upper mandible triangular; front bald; nostrils linear; tongue small or tongueless; feet four-toed, cleft. Three species, as follow:

1. M. Americana. White; quill and tail-feathers purplish black. In multiplying the reptile tribes, which swarm upon those watery tracks that border upon the Amazons and Oroonoko, nature, at the same time, has not only multiplied those birds which are their destroyers, but also proportioned their size and strength to those of the enormous serpents they are to devour.

The American jabiru, one of the largest birds in Guiana, is evidently destined for this purpose: it is more than four feet high; it is six in length, from the tip of the beak to that of the claws; and is entitled to the first rank in the order of waders. The large black bill of this bird is a formidable weapon, being above thirteen inches long, and, at the base, three in thickness. It is upon a large head; is supported by strong muscles inserted into its base; and consists of a horny substance, bent upwards at the top. The head and two-thirds of the neck of the jabiru, are covered with a black and naked skin, thinly interspersed with a few grey hairs. The plumage on the lower part of the neck is red, and gives the bird the appearance of wearing a large collar, while it affords a fine contrast with the rest of the plumage, which is pure white. These birds grow fat in the rainy season, and are then killed by the natives, who reckon them good eating. The species is gregarious and migratory; it feeds on fishes chiefly, which it devours in large quantities; builds in trees hanging over the water, and lays two eggs.

2. M. Asiatica. Indian jabiru. White: band over the eyes; lower part of the back, quill and tail feathers black. Inhabits India; feeds on shell-fishes.

3. M. Novæ Hollandiæ. New Holland jabiru. Body, above purplish-green, beneath, neck and shoulders white; head purplish, spotted with white; irids yellow; first quill-feathers white; tail black and white. Inhabits New Holland. See Nat. Hist. Pl. CLXI.

MYDAS, in the entomological system of Fabricius, a tribe of the genus MUSCA, which see.

MYDRIASIS. (*mydriasis*, μυδριασις; from μυδαω, to abound in moisture; so named because it was thought to originate in redundant moisture). A disease of the iris. Too great a dilation of the pupil of the eye, with or without a defect of vision. It is known by the pupil always appearing of the same latitude or size in the light. The species of mydriasis are, 1. Mydriasis amaurotica, which for the most part, but not always, accompanies an amaurosis. 2. Mydriasis hydrocephalica, which owes its origin to an hydrocephalus internus,

or internal dropsy of the ventricles of the cerebrum. It is not uncommon amongst children, and is the most certain diagnostic of the disease. 3. Mydriasis verminosa, or a dilatation of the pupil from saburra and worms in the stomach or small intestines. 4. Mydriasis a synechia, or a dilatation of the pupil, with a concretion of the uvea with the capsula of the crystalline lens. 5. Mydriasis paralytica, or a dilated pupil, from a paralysis of the orbicular fibres of the iris; it is observed in paralytic disorders, and from the application of narcotics to the eye. 6. Mydriasis spasmodica, or from a spasm of the rectilineal fibres of the iris, as often happens in hysteric and spasmodic diseases. 7. Mydriasis atonica, from atony of the iris, the most frequent cause of which is a large cataract distending the pupil in its passing when extracted. It vanishes in a few days after the operation, in general; a pupil, however long dilated, may remain so from the over and long-continued distension.

MYGINDA, in botany, a genus of the class tetrandria, order tetragynia. Calyx four-parted; petals four; drupe globular. Three species, natives of the West Indies or South America: the most elegant of which is M. aragoga, a South American shrub, with leaves somewhat heart-shaped, pointed, slightly serrate, pubescent, opposite and sessile; corymb axillary; dark, shining red flowers; and soft red fruit.

MYIAGRUS DEUS, in the heathen mythology, a name given sometimes to Jupiter and sometimes to Hercules; when sacrifices are offered to either for the purpose of driving away flies.

MYLABRIS, in the entomological system of Fabricius, a tribe of the genus MELOE, which see.

MYLO. In myology. Names compounded with this word belong to muscles which are attached near the grinders; from μυλη, a grinder tooth; such as,

MYLO-HYOIDEUS. This muscle, which was first described by Fallopius, is so called from its origin near the dentes molares, and its insertion into the os hyoides. It is a thin flat muscle, situated between the lower jaw and the os hyoides, and is covered by the anterior portion of the digastricus. It arises fleshy, and a little tedinous, from all the inner surface of the lower jaw, as far back as the insertion of the pterygoideus internus, or, in other words, from between the last dens molaris and the middle of the chin, where it joins its fellow, to form one belly, with an intermediate tendinous streak, or linea alba, which extends from the chin to the os hyoides, where both muscles are inserted into the lower edge of the basis of that bone. This has induced Riolanus, Winslow, Albinus, and others, to consider it as a single penniform muscle. Its use is to pull the os hyoides upwards, forwards, and to either side.

MYLO-PHARYNGEUS. (*musculus mylo-pharyngeus*, μυλοφαρυγγιαιος; from μυλη, the grinding tooth, and φαρυγξ, the pharynx). A muscle arising near the molares, and inserted in the pharynx. See CONSTRICTOR PHARYNGEUS SUPERIOR.

MYODESOPSIA. (*myodesopsia*, μυωδεσωψια; from μυια, a fly, and οψια, vision). A disease of the eyes, in which the person sees black spots, an appearance of flies, cobwebs, or black wool, before his eyes.

MYO'GRAPHY, a description of the muscles.

MYOLOGY. (*myologia*, μυολογια; from μυς, a muscle, and λογος, a discourse.) The doctrine of the muscles. See ANATOMY.

MYOMANCY, a kind of divination, or method of foretelling future events by means of mice. Some authors hold myomancy to be one of the most ancient kinds of divination; and think it is on this account that Isaiah, lxvi. 17. reckons mice among the abominable things of the idolators. But, beside that it is not certain that the Hebrew word עכבר used by the prophet signifies a mouse, it is evident it is not the divination by that animal, be it what it will, that is spoken of, but the eating of it.

MYONIMA, in botany, a genus of the class tetrandria, order monogynia. Calyx very minute, nearly entire; corol four-parted, with a short tube; drupe with a four-celled, four-seeded nut. Two species, natives of the isle of Bourbon, with opposite leaves and terminal flowers.

MYOPA, in the entomological system of Fabricus, a tribe of the genus CONOPS, which see.

MYOPIA. (*myopia*, μυωπια: from μυω, to wink, and ωψ, the eye). Near-sighted, purblind. The myopes are considered those persons who cannot see distinctly above twenty inches. The myopia is likewise adjudged to all those who cannot see at three, six, or nine inches. The proximate cause is the adunation of the rays of light in a focus before the retina. The species are, 1. Myopia, from too great a convexity of the cornea. The cause of this convexity is either from nativity, or a greater secretion of the aqueous humor: hence on one day there shall be a greater myopia than on another. An incipient hydrophthalmia is the origin of the myopia. 2. Myopia, from too great a longitude of the bulb. This length of the bulb is native, or acquired from a congestion of the humours in the eye; hence artificers occupied in minute objects, as the engravers of seals, and persons reading much, frequently after puberty become myopes. 3. Myopia, from too great a convexity of the anterior superficies in the crystalline lens. This is likewise from birth. The parallel rays which fall into the cornea, by so much they fall more obliquely, so much the more convex is the cornea, or crystalline lens, or vitreous humour in the anterior superficies. But the angle of refraction is equal to the angle of incidence: therefore the angle of refraction so much sooner will be formed as the cornea or lens is more convex. This perfectly accounts for short-sightedness; but an anterior too great convexity of the cornea is the most common

cause. 4. Myopia, from too great a density of the cornea, or humours of the eye. Optics teach us, by so much sooner the rays of light are forced into a focus, by so much the diaphanous body is denser. 5. Myopia, from a mydriasis or too dilated a pupil; for so much the wider the aperture of the diaphragma is in an optical instrument, so much the nearer is the focus. 6. Myopia infantilis. Infants, from the great convexity of the cornea, are often myopes; but by degrees, as they advance in years, they perceive objects more remotely, by the cornea becoming less convex.

MYOPORUM, in botany, a genus of the class didynamia, order angiospermia. Calyx five-parted; corol campanulate, with a spreading, nearly equal, five-parted border; drupe one or two-seeded, with two-celled nuts. Four species, natives of New Zealand or New Caledonia, very nearly related to the genus citharexylon.

MYOPS. (*myops, opis*, μυωψ, from μυω, to wink, and ωψ, the eye). One who is near-sighted.

MYOSIS. (*myosis*, μυωσις). A contraction or too small perforation of the pupil; it is known by viewing the diameter of the pupil, which is smaller than usual, and remains so in an obscure place, where, naturally, if not diseased, it dilates. It occasions weak sight, or a vision that remains only a certain number of hours in the day; but if wholly closed, total blindness. The species of this disorder are, 1. Myosis spasmodica, which is observed in the hysteric, hypochondriac, and in other spasmodic or nervous affections; it arises from a spasm of the orbicular fibres of the iris. 2. Myosis paralytica arises in paralytic disorders. 3. Myosis inflammatoria, which arises from an inflammation of the iris or uvea, as in the internal ophthalmia, hypopium, or wounded eye. 4. Myosis, from an accustomed contraction of the pupil. This frequently is experienced by those who contemplate very minute objects; by persons who write; by the workers of fine needle-work; and by frequent attention to microscopical enquiries. 5. Myosis, from a defect of the aqueous humour, as after extraction. 6. Myosis nativa, with which infants are born. 7. Myosis naturalis, is a coarctation of the pupil by light, or from an intense examination of minutest objects. These coarctations of the pupil are temporary, and spontaneously vanish.

MYOSITIS. (*myositis*, μυοσιτις, from μυς, a muscle). Inflammation of a muscle. It is the term given by Sagar to acute rheumatism.

MYOSOTIS. (*myosotis*, μυοσωτος, from μυς, a muscle, and ους, ωτος, an ear; so called because its leaves are hairy, and grow longitudinally like the ear of a mouse). In botany, a genus of the class pentandria, order monogynia. Corol salver-shaped, five-cleft, slightly notched; the throat closed with concave valves. Eleven species, scattered over the globe; of which the most remarkable is M. scorpioides, common mouse-ear, or, as it is sometimes called, scorpion-grass; a plant indigenous to the walls and sands of our own country, with smooth seeds; lance-elliptic leaves; racemes many-flowered without bractes; more or less hairy, varying in the colour of its flowers.

MYOSURUS. Mouse-tail. In botany, a genus of the class pentandria, order polygynia. Calyx five-leaved, each with a spur at the base; petals five, with a tubular, nectariferous claw; seeds numerous, naked. One species only; a weed found in the corn-fields of our own country, with fibrous root, radical linear-spatulate, rather obtuse leaves, and small, erect, yellowish-green flowers.

MYOXUS. Dormouse. In zoology, a genus of the class mammalia, order glires. Fore-teeth two, upper wedged, lower compressed sideways; whiskers long; tail hairy, round, thicker towards the tip; feet nearly equal in length, four toes before. These animals remain torpid during the winter; walk or rather leap on their hind legs, bounding three or four feet at a time, in which they are assisted by their long stiff tail; feed only on vegetables; burrow under ground; sleep by day, watch by night; carry food to the mouth by the fore-paws, and drink by dipping the fore-palms in water. Four species, as follow:

1. M. glis. Fat dormouse. The glis of Pliny, and the old naturalists: mus glis of Pallas. Sciurus glis of the Systema Naturæ. Le loir of Buffon. Body hoary; beneath whitish; ears thin, naked; cheeks white; whiskers longer than the head; teats ten, six pectoral, four abdominal. Inhabits the woods of Europe and southern Asia; feeds on nuts, walnuts, apple-seeds: forms its nest in hollow trees: bites; sleeps by day; grows very fat in autumn; about October retires by troops into subterraneous caverns, and remains torpid till the end of May; brings from nine to twelve young; six inches long, the tail five. The flesh was formerly esteemed a great delicacy by the Romans, who fattened them as food in receptacles, named gliraria. Its general manners resemble those of the squirrel; it is not easily tamed.

2. M. dryas. Wood dormouse. Body above tawny-grey, beneath dirty-white; a straight black line from ear to ear across the eyes. Inhabits Europe; differs from the rest only in colour; tail shorter, more bushy; no black spots near the ears.

3. M. nitela. Garden dormouse. Body above tawny, beneath whitish ash; a black circle round the eyes, and a black spot behind the ears, which are oblong; eyes large, black. Inhabits Siberia, and the southern parts of Europe, chiefly in gardens, where it destroys all kinds of fruits, especially peaches; makes its nest in holes of walls and hollow trees; smells like a rat; brings from five to six young; body five inches long, tail four.

4. M. muscardinus. Common dormouse. Body tawny; throat whitish; hind-thumbs without claws; eyes large, black, prominent; ears short, round, naked, thin; tail bushy at the tip; body plumper than that of the mouse.

habits Great Britain and other parts of Europe in woods, and thick hedges, seldom in gardens; collects nuts and walnuts, which it eats sitting upright, and buries what is left; forms a nest of grass, moss, or leaves, in the hollow of a tree or low bush; torpid in winter; brings from three to four young: body three inches long, tail rather longer.

MYOTOMY. (*myotomia*, μυοτομια, from μυων, a muscle, and τεμνω, to cut.) Dissection of the muscles.

MYRIAD. *s.* (μύριας.) 1. The number of ten thousand. 2. Proverbially any great number (*Milton*).

MYRICA. Candleberry myrtle. In botany, a genus of the class monoecia, order tetrandria. Calyx, a concave scale of the ament: corolless. Female: styles two; berry one-seeded. Nine species scattered over the globe; of which the following are chiefly cultivated:

1. M. gale. Sweet gale, sweet willow, common candleberry myrtle, Dutch myrtle. It is found wild in our own marshes; rises with many shrubby stalks from two to near four feet high, dividing into several slender branches, covered with a dusty bark, sprinkled with white dots; leaves alternate, rigid, light or yellowish green, smooth, a little serrate towards their point, and emitting a fragrant odour when bruised; aments of a short ovate figure, yellowish-brown colour, and frequently sprinked with shining, resinous, golden particles; fruit a coriaceous berry. It is said that in the north of Europe this plant was used instead of hops in former times, and that it is still applied to the same use in the Hebrides, and some parts of the highlands of Scotland.

2. M. cerifera, American candleberry myrtle. Leaves lanceolate, slightly serrate, stem arboreous, rising to about thirty feet in height; flowers in aments on different individuals; male aments about an inch long, erect; female, sessile, axillary, shorter than the leaves: the branches of the old plants shed their leaves in autumn; but the young plants raised from seeds retain them through the greatest part of the winter, and offer the appearance of an evergreen. The flowers are small, of a whitish colour, and mean to the eye. Its leaves resemble myrtle leaves, and like them, on being rubbed in the hand, emit a most refreshing and delightful fragrance.

It is from the berries of this plant that the inhabitants of Carolina and other parts of America collect a wax, of which they very generally make candles. The wax is produced as follows. In November or December the wild berries are gathered by persons who are used to this occupation, and travel for this purpose with kettles towards the sand banks or sea-side, in which these plants most abound; they build huts for themselves and their families with palmetto leaves, and usually continue about five weeks in a station. The trees are cut down, the berries put into porridge-pots, and afterwards boiled in water till the oil floats; this is then skimmed off into another vessel, and the skimming is continued as long as any oil rises to the surface. When cold it hardens to the consistency of wax, and is of a dirty green colour. It is then boiled again, and clarified in brass kettles, which gives it a transparent green hue. The candles manufactured from this wax burn for a long time, and produce a fragrant smell: a small proportion of tallow however is usually added, which makes them burn clearer.

3. M. quercifolia. Oak-leaved candleberry myrtle. Shrubby, with slender stalks, and oblong, oppositely pinnate leaves, with oval aments between them. The plant retains its leaves all the year, and flowers in June and July.

The two first species may be raised from seeds, the last by layers. The former require a boggy moist situation, or a cultivation in bog-earth. The layers of M. quercifolia should be attempted towards the latter end of the summer, or in the autumn, the shoots being twisted at a joint when laid down, and well watered.

The first two are introduced into the midst of sheltered clumps and borders, and the last into collections of the green-house kind, when their leaves afford an exquisite fragrance.

MYRIOPHYLLUM. Water millfoil. In botany, a genus of the class monoecia, order hexandria. Calyx four-leaved; petals four. Male: stamens eight, longer than the calyx. Female: stigmas four; seeds four, covered with a bark. Two species, both common to the ditches of our own country.

MYRISTICA. Nutmeg-tree. In botany, a genus of the class dioecia, order triandria. Calyx three-cleft, corolless. Male: anthers uniting round the upper part of the filament. Female: stigma cloven, capsule superior, drupaceous, two-valved; nut invested with a variously lacerated membrane. Three species:

1. M. sebifera. A Guiana tree, with leaves hearted, oblong, downy underneath, and downy fruit. The tree rises from forty to sixty feet high, discharging a thick acrid red juice from its trunk on its being wounded; and yields a nutmeg, from which a considerable portion of fatty oil is expressed, employed by the natives of Guiana in the manufacture of candles.

2. M. fatua. A nutmeg-tree of Tobago, rising to the height of our common apple-tree; with oblong, lanceolate, downy leaves, and downy fruit. The nutmeg is aromatic, but narcotic; and when taken in considerable quantity produces delirium.

3. M. aromatica. Calyx ovate, three-cleft at the top: leaves elliptic, pubescent underneath, alternate, pointed, undulate; peduncles axillary, solitary, two or three-flowered; fruit glabrous; nut surrounded with a fulvous, tough, reticulate covering, which is the mace of the shops.

It is doubtful whether the Greeks or Romans were acquainted with the nutmeg. It is said by some that Theophrastus alludes to it under the name of comacum, and by others that it is the chrysobalanos of Galen. Yet we know nothing decisively upon the subject. It was first introduced into modern Europe by

the Arabians, and in Avicenna it appears under the name of jiansiban, or jansiband, which signifies nut of Banda.

Both the male and female flowers yield a nut. The female nut is that in common use; the male is longer and more cylindric, but it has less of fine aromatic flavour. It is more subject to be worm-eaten, and to harbour the insect that preys upon the nutmeg, than the female; and hence the Dutch strictly prohibit its being packed up with the latter, lest the worm should be communicated to the whole package. The chief nutmeg trade lies at Ceylon; and has passed, with the islands, from the hands of the Dutch to those of the English.

When the fruit is ripe the natives ascend the trees, and gather it by pulling the branches towards them with long hooks. The first rind is instantly taken off, and the soil on which any large quantity of this is deposited shoots forth very speedily a nutmeg-boletus, or mushroom, from the putrefaction of the general mass, which is regarded by the natives as a very delicate food.

The mace is a filamentous substance, adhering to the nut, and traced after the external rind has been removed. Its first appearance presents a beautiful red; but the colour changes on exposure to the air to a darker hue. The mace being taken off with the knife, is laid to dry in the sun for eight or nine hours, and is then removed to a place less heating, that it may not become too dry; to prevent which, in a still greater degree, it is moistened with a small quantity of sea-water; and is afterwards put into small bags, and packed up very close.

The mace being thus stripped off, the nuts are still covered with their ligneous shell; and are exposed for three days to the sun, and afterwards to the fire, till they emit a sound on being shaken: they are then beaten with small sticks, which break the remaining shells, and make them fly off in small pieces. The nuts are then distributed into three parts: the largest and most beautiful are selected for the European market; those of less beauty are reserved for the use of the inhabitants, or are employed for the purpose of affording oil by pressure: while the remainder, which consists of the smallest and the unripe, are burnt. A pound of nutmegs generally affords about three ounces of oil, of the consistence of tallow, and has all the taste of the nutmeg. This is the genuine oil of mace of the shops.

To preserve the select nutmegs, and fit them for an European voyage, they are plunged in small baskets, two or three times, into a thick lime-water prepared with the calcined shells of testaceous fishes, to which a considerable quantity of sea-salt has been added. With this calcareous matter they soon become completely covered over; when they are laid in a heap, and lose their superfluous water by evaporation. They are then properly prepared for sea-carriage.

For the medical properties and preparations of nutmeg, see the article NUX MOSCHATA, under which name it has been generally prescribed in the different pharmacopœias.

MYRMECIA, in botany, a genus of the class tetrandria, order monogynia. Calyx campanulate, five-toothed; corol tubular, with an inflated throat; glands five, surrounding the base of the germ; capsule two-celled, two-valved, many-seeded. One species: a climbing shrub of Guiana, with knotty square branches; leaves opposite, oblong; flowers small, solitary, axillary.

MYRMECOPHAGA. Ant-eater. In zoology, a genus of the class mammalia, order bruta. Toothless; tongue round, extensile; mouth narrowed into a snout; body covered with hair. Seven species, inhabitants of South America, Cape of Good Hope, Australasia, or India. The following are the chief.

1. M. jubata. Great ant-eater. Toes on the fore-feet four, on the hind-feet five; tail bushy.

Another variety, with face and legs shorter, without a stripe on the sides and breast. The former and more common variety has a long slender nose; small black eyes; short round ears; slender tongue, two feet long, which lies double in its mouth; slender legs; the two middle claws on the fore-feet very large, strong, and hooked. The hair on the upper part of the body half a foot long, black mixed with grey. Across its shoulders there is a black stripe bounded above with white. The forelegs whitish, with a black spot above the feet. The hair of the tail coarse, black, and about a foot long. This animal is about three feet ten inches long; its tail two: it weighs above a hundred pounds. Inhabits Brazil and Guiana; runs slowly; swims over the great rivers, at which time it flings its tail over its back: lives on ants; overturns their nests, or digs them up with its fore-feet, then thrusts its long tongue into their retreats, and withdraws it into its mouth loaded with prey: is afraid of rain, and protects itself from it by covering its body with its long tail: it does not attain its full growth under four years. Each species of this genus brings but one young one at a time. Notwithstanding its want of teeth, it is fierce and dangerous, especially when it has young. Nothing that it has once got between its fore-feet can disengage itself; the very panthers of America are often unequal to the combat. So great is its obstinacy and stupidity, that it will not extricate itself even from a dead adversary. It sleeps in the day, and preys by night. Its flesh has a strong disagreeable taste; but it is eaten by the Indians.

2. M. didactyla. Least ant-eater. Toes on the fore-feet two, on the hind-feet four: tail bushy: nose conic, bending a little down; small ears, hid in its fur; upper parts covered with long soft silky hair, or rather wool, of a yellowish brown colour: seven inches and a half long: its tail, which is thick at the base, and tapers to a point, measures eight and a half, and is naked on the under side for the last four: it inhabits Guiana, and climbs trees in

quest of a species of ants which build their nests among the branches. It has the size and prehensile power of the squirrel: walks slowly on the heels; feeds only in the night; emits no cry.

3. M. pentadactyla. Striped ant-eater. Toes on the fore feet five: tail long, flat, entirely covered with hair: head thick, upper jaw and snout very long, eyes small; ears small, rounded, fringed above with black hairs; hair long; back, head, legs tawny; belly dirty white; tail annulate with blackish hair: length thirteen inches, height ten.

4. M. aculeata. Porcupine ant-eater. Body covered with long sharp spines: tail very long. Spines on the back and sides resembling those of a porcupine, white, with black tips, and a circle of dull orange between the colours; head and under-parts deep-brown; tail short, naked, a little flattened at the tip, covered at the root with upright spines; eyes small, black, irids blueish; legs short, thick, five-toed; toes broad, round; claws black, on the hind-feet only four, the first long, sharp, carved, second shorter, two others shorter still. Inhabits New Holland: size of a rat.

5. M. Capensis. Cape ant-eater. Toes on the fore-feet, four; snout long; ears large, pendulous; tail shorter than the body, tapering to the tip. Inhabits the Cape of Good Hope; nearly the size of a hog, and weighing almost a hundred pounds; burrows in the ground; sleeps by day, prowls by night. See Nat. Hist. Pl. CLV.

MYRMELEON. Lion-ant. Mouth with a horny acute mandible and jaw; feelers six; stemmaless; antennas thicker at the tip; wings deflected; tail of the male armed with a forceps composed of two straight filaments.

The animals of this family prey with the most savage ferocity upon ants and smaller insects, though they seem at first sight but ill calculated for this manner of life, all their progress in walking being backwards: by stratagem, however, the lion-ant masters insects far superior to itself in strength. In the loose sand it digs a hollow resembling a funnel, where it takes its station at the bottom, every part being concealed except the forceps, with which the head is armed. This instrument, which it can open or shut at pleasure, is curiously constructed for seizing and penetrating the hardest insect; and unhappy is the animal who, in pursuing it journey, stumbles into this cavern. In vain it endeavours to scramble up by the edges, which are continually giving way under its feet; it tumbles to the bottom, where it is pierced by the forceps of the lion ant lurking below.

If the insect be small, and the grains of sand, notwithstanding the declivity of the funnel, do not give way under its feet, the myrmeleon has another invention by which he renders himself master of his prey; with his head, which is flattened, he throws up repeated showers of sand from the bottom of the funnel, which falling upon the sides, force down the insect till it comes within reach. The fatal instruments with which this animal seizes its prey are each a sort of mouth or trunk, by which it sucks out the entire entrails.

When the lion-ant has attained its full size, it constructs for itself an edifice, the external parts of which are particles of sand or earth combined together by silken threads: the interior cavity is lined with pure silk, white and glossy, like satin. Within this ball the myrmeleon is changed into a chrysalis, of a curved or semicircular shape, displaying all the parts of the perfect insect that is soon to issue from it.

After the chrysalis bursts, the winged insect which makes its escape is of a gray colour, with a long slender body, resembling the libellula. In this country the myrmeleon is very scarce; a few, however, are found to breed among the loose earth at the bottom of walls which have a south exposure. In that dry, pulverized, and sandy earth their eggs are protected from rain, till they are hatched by the sun. Vallisnieri and Poupart first gave the history of the lion-ant; that of the former is in the form of a dialogue between Malphighi and Pliny, in which the modern informs the ancient naturalist of the singular manœuvres and metamorphosis of these animals. There are sixteen species; which may be thus subdivided.

A Hind-feelers much longer than the rest; jaw one-toothed; lip membranaceous, square, truncate, emargenate.

B Feelers nearly equal; jaw ciliate; lip horny, rounded, entire. This division constitutes the ascalaphus of Fabricius.

The different species inhabit the warmer parts of Europe, Africa, India, and America. The only species traced in our own country is M. formicarius; its wings clouded with brown, with a white marginal spot behind. See Nat. Hist. Pl. CLX.

MYRMIDONS, Myrmidones, in antiquity, a people on the southern borders of Thessaly, who accompanied Achilles to the Trojan war. They received the name from Myrmidon, a son of Jupiter and Eurymedusa, who married one of the daughters of Æolus, son to Helen. His son Actor married Ægina the daughter of Asopus. He gave his name to his subjects, who dwelt near the river Peneus in Thessaly. According to some, the Myrmidons received their name from their having arisen from ants or pismires, upon a prayer put up for that purpose by king Æcus to Jupiter, after his kingdom had been dispeopled by a severe pestilence. According to Strabo, they received it from their industry, because they imitated the diligence of the ants, and like them were indefatigable, and were continually employed in cultivating the earth.

MYROBALANUS (*myrobalanus*, μυροβαλανος, from μυρον, an unguent, and βαλανος, a nut, so called because it was formerly used in ointments.) A myrobalan. A dried fruit, of the plum kind, brought from the East Indies. All the myrobalans have an unpleasant, bitterish, very austere taste, and strike an inky blackness with a solution of sal martis. They

are said to have a gently purgative as well as an astringent and corroborating virtue. In this country they have been long expunged from the pharmacopœias.

MYROBALANUS BELLIRICA. The belliric myrobalan. This fruit is of a yellowish grey colour, and an irregularly roundish or oblong figure, about an inch in length, and three quarters of an inch thick.

MYROBALANUS CHEBULA. The chebule myrobalan. This resembles the yellow in figure and ridges, but is larger, of a darker colour inclining to brown, or blackish, and has a thicker pulp.

MYROBALANUS CITRINA. Yellow myrobalan. This fruit is somewhat longer than the belliric, with generally five large longitudinal ridges, and as many smaller between them, somewhat pointed at both ends.

MYROBALANUS EMBLICA. The emblic myrobalan is of a dark blackish grey colour, roundish, about half an inch thick, with six hexagonal faces, opening from one another.

MYROBALANUS INDICA. The Indian or black myrobalan, of a deep black colour, oblong, octangular, differing from all the others in having no stone, or only the rudiments of one, from which circumstance they are supposed to have been gathered before maturity.

MYROBALANS. See MYROBALANUS.

MYRODENDRUM, in botany, a genus of the class polyandria, order monogynia. Calyx five-toothed; petals five; stigma five-lobed; pericarp five-celled, with a single seed in each. One species; a Cayenne tree, fifty feet high, with leaves alternate, lanceolate, acute, clasping the stem, crenate, glabrous; flowers in terminal corymbs.

MYRODIA, in botany, a genus of the class monodelphia, order polyandria. Calyx single, tubular, bursting at top; petals five; style filiform; drupe dry, two or three-celled; the cell one-seeded. Two species, shrubs of the Caribbees and of Guiana.

MYRO'POLIST. *s.* (μυ[illegible] and πωλεω.) One who feels unguents.

MYROSMA, in botany, a genus of the class monandria, order monogynia. Calyx double; the outer three-leaved, inner, three-parted; corol five-parted, irregular; capsule three-cornered, three-celled, many-seeded. One species; a Surinam shrub, growing like the canna root; fleshy, ovate; raceme like the ament of a hop, imbricate, with alternate scales of the bractes; bractes two-leaved, two-flowered.

MYROTHECIUM, in botany, a genus of the class cryptogamia, order fungi. Fungus sessile, cup-shaped; the cupola volate above; seeds rather viscid. Five species; all exotic plants.

MYROXYLON, in botany, a genus of the class decandria, order monogynia. Calyx campanulate, five-toothed; petals five, the upper ones larger than the rest: germ longer than the corol; legume one-seeded at the tip. Three species, all natives of South America; of which the following is the chief.

M. peruiferum. Balsam of Peru tree. Tree with a smooth, thick, resinous bark; leaves abruptly pinnate, in double pairs; full of linear shining resinous dots; leaflets nearly opposite, ovate-lanceolate, with an obtuse emarginate tip; racemes axillary.

The balsam obtained from this plant is extracted from it by coction, and is brought over to the consistence of thin honey, of a reddish-brown colour, inclining to black, possessing an agreeable aromatic smell, and a very hot biting taste. Distilled with water this balsam yields a small quantity of a fragrant essential oil of a reddish colour; and gives also in a strong fire a yellowish red oil. For its medical properties, see BALSAMUM PERUVIANUM.

MYRRH. (*myrrha*, Hebrew.) A botanical specimen of the tree which affords this gum-resin has not yet been obtained; but from the account of Mr. Bruce, who says it very much resembles the acacia vera, which is the mimosa nilotica of Linnéus, there can be little doubt in referring it to that genus, especially as it corresponds with the description of the tree given by Dioscorides. The tree that affords the myrrh, which is obtained by incision, grows on the eastern coast of Arabia Felix, and in that part of Abyssinia which is situated near the Red Sea, and is called by Mr. Bruce troglodite. Good myrrh is of a foul black red colour, solid and heavy, of a peculiar smell, and bitter taste. Its medicinal effects are warm, corroborant, and antiseptic; it has been successfully employed in phthisical cases as a pectoral; and although allied to some of the balsams, it is found to be more efficacious and less irritating to the system. There are several preparations of this drug in the London and Edinburgh pharmacopœias.

MYRRH FERN, in botany. See SCANDIX.

MYRRHINE. See MURRHINE.

MYRSINE, in botany, a genus of the class pentandria, order monogynia. Corol half five-cleft, connivent; germ filling the corol; drupe one-seeded, with a five-celled nut. Two species; one an African plant with elliptic acute leaves, and axillary flowers, three together, on short peduncles: and the other a plant of the Azores, with obovate, obtuse leaves, and subsessile flowers, crowded and somewhat corymbed. Both are occasionally found in our green-houses; and may be raised by planting cuttings of the young shoots in pots in summer, frequently giving them water, and restraining them to the shade.

MYRTACANTHA. (*myrtacantha*, μυρτακανθα, from μυρτος, a myrtle, and ακανθα, a thorn; so called from its likeness to myrtle, and from its prickly leaves). Butchers broom. See RUSCUS.

MYRTIFORUS, in anatomy, an appellation given to several parts, because of their resembling myrtle-berries.

MYRTIFORM CARUNCLES. The remains of the hymen. See GLANDULÆ MYRTIFORMES.

MYRTIFORM GLANDS. See GLANDULÆ MYRTIFORMES.

MYRTILLUS. (*myrtillus*). The berries which are directed in pharmacopœias by the name of baccæ myrtillorum are the fruit of the vaccinium myrtillus of Linnéus. Prepared with vinegar they are esteemed as antiscorbutics, and when dry possess astringent virtues.

MYRTLE, in botany. See MYRTUS.

MYRTLE (Candleberry). See MYRICA.

MYRTLE-LEAVED SUMACH. See CORIAREA.

MYRTO-CISTUS. See HYPERICUM.

MYRTLE (Dutch). See MYRICA.

MYRTUS; myrtle. In botany, a genus of the class icosandria, order monogynia; calyx four or five-cleft, superior: petals four or five; berry two or three-celled; seeds numerous, gibbous. Twenty-eight species, often, however, made more numerous from the introduction of plants that belong to other genera. These are uniformly natives of warm climates, and for the most part indigenous to India, South America, the West Indies, or the Cape. The three following are those mostly entitled to attention.

1. M. communis. Common myrtle. Flowers solitary, with a two-leaved involucre. It is a native of Asia, Africa, and the south of Europe, and the parent of all the common varieties of myrtle we meet with in our gardens and green-houses. Of these varieties the chief are:—

α. Common broad-leaved or Roman myrtle.
β. Box-leaved myrtle.
γ. Common Italian or upright myrtle, of which the nutmeg myrtle is a subvariety.
δ. Orange, or bay-leaved myrtle.
ε. Portugal myrtle.
ζ. Broad-leaved Dutch myrtle.
η. Double-flowering myrtle.
θ. Rosemary, or thyme-leaved myrtle.

All these varieties are constant; but there are others which are far less marked and more fugitive; as, for instance, the gold-striped, broad-leaved myrtle; broad-leaved Jews myrtle; gold-striped orange-leaved myrtle; silver-striped Italian myrtle; striped box-leaved myrtle; coxcomb, or birds-nest myrtle, &c.

These are all easily propagated from cuttings. The best season for this is July; and the straitest and youngest vigorous shoots are to be chosen. These should be cut off about eight inches long, and the leaves of the lower part stripped off to two inches high, and that part of the stalk twisted which is to be placed in the ground; they are to be planted in pots of light rich earth, at about two inches distance from each other, observing to close the earth very well about them, and give them a gentle watering. They are then to be removed into a moderate hot-bed, and shaded and watered once in two or three days till they have taken root. In about a month's time they will be rooted, and will begin to shoot, and must then be inured by degrees to the air; and in August they should be removed into the open air, but placed in a warm situation, and sheltered from the winds; they should stand here till October, and then be removed into a green-house, where they should be placed so as to have as much air as possible. In the March following they should be removed into separate pots of rich earth, and in May set out to the open air in a warm and well-defended place. They will require in the summer frequent waterings, and the dead leaves should be carefully picked off. As they advance in growth, they are to be shifted at times into pots of a larger size; and this should be done either in April or in August; and towards the end of October they should always be removed into the green-house.

2. M. pimenta. Pimento myrtle. A tree about fifty feet high; leaves alternate, elliptic, veined; flowers panicled on trichotomous peduncles; calyx four-cleft; petals four. The branches on the top are much divided, and possess a rich foliage, the perpetual verdure of which always gives the tree a very high degree of beauty. It is a native of New Spain and of the West-Indies. In Jamaica it grows very plentifully; and in June, July, and August, puts forth its flowers, which, with every part of the tree, breathe an aromatic fragrance. The berries, when ripe, are of a dark purple colour, and full of a sweet pulp, which the birds devour greedily. It is these dried berries that are denominated pimento, allspice, or Jamaica pepper. For their medical properties, see PIMENTO.

3. M. caryophyllata. Clove myrtle. Peduncles trichotomous, terminal; calyx undivided; leaves obovate, not dotted, slightly petioled. The bark of this tree has a considerable resemblance in smell and taste to the clove-spice or fruit of the eugenia caryophyllata, and are often recommended in the dispensatories on this account, under the name of CASSIA CARYOPHYLLATA, which see. It is a native of Ceylon.

MYRTUS BRABANTICA. Gaule. Sweet willow, or Dutch myrtle. The leaves, flowers, and seeds of this plant, myrica gale of Linnéus, have a strong fragrant smell, and a bitter taste. They are said to be used amongst the common people for destroying moths and cutaneous insects, and the infusion is given internally as a stomachic and vermifuge.

MYSELF. *s.* (*my* and *self.*) 1. An emphatical word added to *I*: as, *I* myself *do it*; that is, not I by proxy; not another. 2. The reciprocal of I, in the oblique case.

MYSIA, a country of Asia Minor, generally divided into Major and Minor. Mysia Minor was bounded on the north and west by the Propontis and Bithynia, and Phrygia on the southern and eastern borders. Mysia Major had Æolia on the south, Ægean on the west, and Phrygia on the north and east. Its chief cities were Cyzicum, Lampsacus, &c. The inhabitants were once very warlike; but they greatly degenerated; and the words *Mysorum ultimus* was emphatically used to signify a person of no merit. The ancients generally hired

them to attend their funerals as mourners, because they were naturally melancholy and inclined to shed tears. They were once governed by monarchs. They are supposed to be descended from the Mysians of Europe, a nation who inhabited that part of Thrace which was situated between Mount Hæmus and the Danube.

MYSON, a native of Sparta, one of the seven wise men of Greece. When Anacharsis consulted the oracle of Apollo, to know which was the wisest man in Greece, he received for answer, he who is now ploughing his fields. This was Myson.

MYSORE, a province of Hindustan, which takes its name from a town situated about ten miles south from the river Cauvery, formerly governed by an Hindu prince What is called the kingdom of Mysore, includes, besides the Mysore Proper, the countries of Bednore, Coimbetore, Canara, and Dindigul, with some others, the whole forming an extent near 500 miles, from north to south, and near 300, where broadest, from east to west, though in some places it is hardly 100, and, towards the south, narrowed almost to a point. Mysore, on the north, is bounded by the countries of Visiapour and Golconda, on the east by the Carnatic, on the south by Madura Travancore, and Cochin, and on the west by the Indian Sea. On the death of the last Hindu king, Hyder Ally, a soldier of fortune, declared himself regent, and imprisoned the young prince, who was to have succeeded his father. Hyder had risen from a low rank, to the supreme command of the army. On a complaint that the English had not kept their treaties with him, he made an irruption into the Carnatic. The war continued with various success, during the years 1767, 1768, and part of 1769; when Hyder, with a strong detachment of chosen troops, chiefly horse, giving the British army the slip, came within seven miles of Madras, and dictated a peace to the government of that place. Some years afterwards hostilities were again commenced, and successively renewed, till the death of Hyder Ally, and even after his death, by his son Tippoo; till, in the year 1792, after several defeats, Tippoo was compelled to make peace, on the humiliating terms of surrendering great part of his dominions to the English and their friends, and the payment of thirty lacks of rupees; and for the due performance of the articles of the treaty, two of the sultan's eldest sons were sent as hostages to lord Cornwallis, the commander of the British army. The gross revenue of Tippoo has been stated at four crores of rupees, or as many millions sterling. His military establishment was very great, being no less than 72,800 regulars, including 740 Europeans, under the command of French officers: besides troops in the frontier garrisons to the amount of 49,000. The remainder of his force consisted of irregulars of various descriptions, and amounts to 33,000, and upwards; so that the whole force of Tippoo was reckoned at 155,000, of which near 73,000 were of a class much superior to any troops that have ever been raised and disciplined by a native of India.

MYSORE, a fortified town of Hindustan, anciently the capital of the country so called: ten miles S. Seringapatam.

MYSTAGO'GUE *s.* (μυσταγωγός.) One who interprets divine mysteries; also one who keeps church relics, and shows them to strangers (*Bailey*).

MYSTAX. The hair which forms the beard in man, on each side the upper lip.

MYSTE'RIARCH. *s.* (μυστήριον and ἀρχή.) One presiding over mysteries.

MYSTE'RIOUS. *a.* (*mysterieux*, French.) 1. Inaccessible to the understanding; awfully obscure (*Denham*). 2. Artfully perplexed (*Swift*).

MYSTE'RIOUSLY. *ad.* (from *mysterious.*) 1. In a manner above understanding. 2. Obscurely; enigmatically (*Taylor*).

MYSTE'RIOUSNESS. *s.* (from *mysterious*) 1. Holy obscurity (*Taylor*). 2. Artful difficulty or perplexity.

To MY'STERIZE. *v. a.* (from *mystery.*) To explain as enigmas (*Brown*).

MY'STERY. *s.* (μυστήριον; *mystere*, French.) 1. Something above human intelligence; something awfully obscure (*Taylor*). 2. An enigma; any thing artfully made difficult (*Shakspeare*). 3. A trade; a calling: in this sense it should, according to *Warburton*, be written *mistery*, from *mestier*, French, a trade (*Shakspeare*).

MYSTERY, *mysterium*, something secret or hidden; impossible or difficult to be comprehended. The word comes from the Greek μυστηριον; and, that according to some etymologists, from μυω, *claudo*, *tacco*, I shut, I am silent, and στομα, mouth; but then whence comes the τ? Must the μ in στομα be converted into an τ? The word seems derived, with more propriety, from the Hebrew סתר *sator*, to hide; whence is formed מסתר *mistar*, a hidden thing.

Mystery is primarily used in speaking of certain truths revealed in scripture, into the full understanding whereof human reason cannot penetrate. Such are said to be the doctrines of the trinity, the incarnation, &c. We have an epitome of the mysteries of faith, or the mysteries of christianity, in the symbols or creeds, compiled by the apostles, the council of Nice, and St. Athanasius. (See CREED.) In some of these mention is made of the mystery of the trinity; the mysteries of the incarnation of the Son of God, his death and passion, and his descent into hell, for the redemption of mankind; of his resurrection the third day, his ascension into heaven, his sitting on the right hand of God, and his coming again to judge the world; of the divinity and coequality of the Holy Ghost with the Father and the Son; of the unity of the church; of the communion of saints; the participation of the sacraments; and the general resurrection.

It is very customary with unbelievers to affirm that they will believe nothing which they cannot comprehend, and thence to reject the

christian religion. But Dr. Gregory, in his "Letters on the Evidences, Doctrines, and Duties of the Christian Religion," just published by Baldwin, has shewn that this objection is untenable, being founded in a neglect of the essential distinction between what is above reason, and what is contrary to it. He also shews, by running over the general principles of various branches of mathematical, chemical, and metaphysical science, that the difficulties attending christianity on the score of its mysterious or incomprehensible parts are of the same kind (and probably should be referred to the same cause, the weakness of our faculties) as those which envelope all the fundamental principles of knowledge. See vol. i. pa. 37—77.

The heathens also had their mysteries, particularly those of Ceres (see ELEUSINIA), the Bona Dea, &c. The Egyptian priests concealed the mysteries of their religion and philosophy under hieroglyphics. Those who revealed the mysteries of the Bona Dea were severely punished; and none were trusted with them but those solemnly initiated, and sworn to secrecy. But these were not called mysteries, as being incomprehensible, or raised above the power of reason; but because they were covered and disguised under types and figures, to raise the greater veneration in the people. The mysteries of paganism were usually celebrated in caves and grottos, fitter to conceal crimes than to celebrate mysteries in.

MY'STICAL. MY'STIC. *a.* (*mysticus*, Latin.) 1. Sacredly obscure (*Hooker*). 2. Involving some secret meaning; emblematical (*Taylor*). 3. Obscure; secret (*Dryden*).

MY'STICALLY. *ad.* (from *mystical.*) In a manner, or by an act, implying some secret meaning (*Donne*).

MY'STICALNESS. *s.* (from *mystical.*) Involution of some secret meaning.

MYSTIC THEOLOGY denotes a refined and sublime kind of divinity, professed by the mystics.

It consists in a knowledge of God, and divine things, not acquired in the common way, but infused immediately by God, and which has the power to move the soul in an easy, calm, devout, affective manner; to unite it ultimately to God; to illumine the understanding, and to warm and enliven the will, in an extraordinary manner.

Among the writings attributed to Dionysius the Areopagite, is a discourse of mystic theology. Several others have written on the same subject, both ancients and moderns.

MYSTICS, *mystici*, a kind of religious sect, distinguished by their professing pure, sublime, and perfect devotion, with an entire disinterested love of God, free from all selfish considerations.

The mystics, to excuse their fanatic ecstasies, and amorous extravagancies, allege that passage of St. Paul; The spirit prays in us by sighs and groans that are unutterable. Now, if the spirit, say they, pray in us, we must resign ourselves to its motions, and be swayed and guided by its impulse, by remaining in a state of mere inaction.

Passive contemplation is that state of perfection to which the mystics all aspire.

The authors of this mystic science, which sprung up towards the close of the third century, are not known; but the principles from which it was formed are manifest. Its first promoters proceeded from the known doctrine of the Platonic school, which was also adopted by Origen and his disciples, that the divine nature was diffused through all human souls, or that the faculty of reason, from which proceeds the health and vigour of the mind, was an emanation from God into the human soul, and comprehended in it the principles and elements of all truth, human and divine. They denied that men could by labour or study excite this celestial flame in their breasts, and, therefore, they disapproved highly of the attempts of those, who, by definitions, abstract theorems and profound speculations, endeavoured to form distinct notions of truth, and to discover its hidden nature. On the contrary, they maintained that silence, tranquillity, repose, and solitude, accompanied with such acts as might tend to extenuate and exhaust the body, were the means by which the hidden and internal word was excited to produce its latent virtues, and to instruct men in the knowledge of divine things.

MYTENS (Arnold), a painter, born at Brussels in 1541. He formed his style in the taste of the Roman school, and painted several capital pictures for churches in Italy. He died in 1602.

MYTENS (Martin), a Swedish painter, born at Stockholm in 1695, and died in 1755. He visited various countries, and had the honour to paint the portraits of several princes, particularly the czar Peter, who pressed him to settle at Petersburgh; but being bent on a journey to Italy, he declined the offer. At length he settled at Vienna, where he was held in great esteem by the emperor Charles VI. His best performance is a representation of the story of Esther and Ahasuerus (*Watk.*).

MYTHOLO'GICAL. *a.* (from *mythology.*) Relating to the explication of fabulous history (*Brown*).

MYTHOLO'GICALLY. *ad.* (from *mythological.*) In a manner suitable to the system of fables.

MYTHO'LOGIST. *s.* (from *mythology.*) A relater or expositor of the ancient fables of the heathens (*Creech. Norris*).

To MYTHO'LOGIZE. *v. n.* (from *mythology.*) To relate or explain the fabulous history of the heathens.

MYTHOLOGY is compounded of two Greek words, and in its original import it signifies any kind of fabulous doctrine: in its more appropriated sense, it means those fabulous details concerning the objects of worship which were invented and propogated by men who lived in the early ages of the world, and by them transmitted to succeeding generations, either by written records or by oral tradition.

MYTHOLOGY.

As the theology and mythology of the ancients are almost inseparably connected, it will be impossible for us to develope the latter, without often introducing some observations relating to the former. We must therefore intreat the indulgence of our readers, if upon some occasions we should hazard a few strictures on the names, characters, adventures, and functions of such pagan divinities as may have furnished materials for those fabulous narrations which the nature of the subject may lead us to discuss.

With respect to fable, it may be observed in general, that it is a creature of the human imagination, and derives its birth from that love of the marvellous which is in a manner congenial to the soul of man. The appearances of nature which every day occur, objects, actions, and events, which succeed each other, by a kind of routine, are too familiar, too obvious, and uninteresting, either to gratify curiosity or to excite admiration. On the other hand, when the most common phenomena in nature or life are new-modelled by the plastic power of a warm imagination; when they are diversified, compounded, embellished, or even arranged and moulded into forms which seldom or perhaps never occur in the ordinary course of things; novelty generates admiration, a passion always attended with delightful sensations. Here then we imagine we have discovered the very source of fiction and fable. They originated from that powerful propensity in our nature towards the new and surprising, animated by the delight with which the contemplation of them is generally attended.

Many circumstances contributed to extend and establish the empire of fable. The legislator laid hold on this bias of human nature, and of course employed fable and fiction as the most effectual means to civilize a rude, unpolished world. The philosopher, the theologist, the poet, the musician, each in his turn, made use of this vehicle to convey his maxims and instructions to the savage tribes. They knew that truth, simple and unadorned, is not possessed of charms powerful enough to captivate the heart of man in his present corrupt and degenerate state. This consideration, which did indeed result from the character of their audience, naturally led them to employ fiction and allegory. From this was derived the allegorical taste of the ancients, and especially of the primary sages of the east.

Though almost every nation on the face of the globe, however removed from the centre of population, however savage and averse from cultivation, has fabricated and adopted its own system of mythology; the Orientals, however, have distinguished themselves in a peculiar manner, by the boldness, the inconsistency, and the extravagance of their mythology. The genial warmth of those happy climes, the fertility of the soil, which afforded every necessary, every conveniency, and often every luxury of life, without depressing their spirits by laborious exertions; the face of nature perpetually blooming around them, the skies smiling with uninterrupted serenity; all contributed to inspire the orientals with a glow of fancy and a vigour of imagination rarely to be met with in less happy regions. Hence every object was swelled beyond its natural dimensions. Nothing was great or little in moderation, but every sentiment was heightened with incredible hyperbole. The magnificent, the sublime, the vast, the enormous, the marvellous first sprung up, and were brought to maturity, in those native regions of fable and fairy-land. As nature, in the ordinary course of her operations, exhibited neither objects nor effects adequate to the extent of their romantic imaginations, they naturally deviated into the fields of fiction and fable. Of consequence, the custom of detailing fabulous adventures originated in the east, and was from thence transplanted into the western countries.

As the allegorical taste of the eastern nations had sprung from their propensity to fable, and, as that propensity had in its turn originated from the love of the marvellous; so did allegory in process of time contribute its influence towards multiplying fables and fiction almost *in infinitum*. The latent import of the allegorical doctrines being, in a few ages lost and obliterated, what was originally a moral or theological tenet assumed the air and habit of a personal adventure.

The propensity towards personification, almost universal among the orientals, was another fruitful source of fable and allegory. That the people of the east were strongly inclined to personify inanimate objects and abstract ideas, we imagine will be readily granted, when it is considered, that in the formation of language they have generally annexed the affection of sex to those objects. Hence the distinction of grammatical genders, which is known to have originated in the eastern parts of the world. The practice of personifying virtues, vices, religious and moral affections, was necessary to support that allegorical style which universally prevailed in those countries. This mode of writing was in high reputation even in Europe some centuries ago; and to it we are indebted for some of the most noble poetical compositions now extant in our own language. Those productions, however, are but faint imitations of the original mode of writing still current among the eastern nations. The Europeans derived this species of composition from the Moorish inhabitants of Spain, who imported it from Arabia, their original country.

The general use of hieroglyphics in the East must have contributed largely towards extending the empire of mythology. As the import of the figures employed in this method of delineating the signs of ideas was in a great measure arbitrary, mistakes must have been frequently committed in ascertaining the notions which they were at the first intended to represent. When the development of these arbitrary signs happened to be attended with uncommon difficulty, the expounders were obliged to have recourse to conjecture. Those conjectural expositions were for the most part tinctured with that bias towards the marvellous which universally prevailed among the primitive men. This we find is the case even at this day, when moderns attempt to develop the purport of emblematical figures, preserved on ancient medals, intaglios, &c.

The wise men of the East delighted in obscure enigmatical sentences. They seem to have disdained every sentiment obvious to vulgar apprehension. The words of the wise, and their dark sayings, often occurred in the most ancient records both sacred and profane. The sages of antiquity used to vie with each other for the prize of superior wisdom, by propounding riddles, and dark and mysterious questions, as subjects of investigation. The contest between Solomon and Hiram; and that between Amasis king of Egypt and Polycrates tyrant of Samos, are universally known.— As the import of those enigmatical propositions was often absolutely lost, in ages when the art of

writing was little known, and still less practised, nothing remained but fancy and conjecture, which always verged towards the region of fable. This then, we think, was another source of mythology.

The pagan priests, especially in Egypt, were probably the first who reduced mythology to a kind of system The sacerdotal tribe, among that people, were the grand depositaries of learning, as well as of religion. That order of men monopolised all the arts and sciences. They seemed to have formed a conspiracy among themselves, to preclude the laity from all the avenues of intellectual improvement. This plan was adopted with a view to keep the laity in subjection, and to enhance their own importance. To accomplish this end, they contrived to perform all the ministrations of their religion in an unknown tongue, and to cover them with a thick veil of fable and allegory. The language of Ethiopia became their sacred dialect, and hieroglyphics their sacred character. Egypt, of course, became a kind of fairyland, where all was jugglery, magic, and enchantment. The initiated alone were admitted to the knowledge of the occult mystical exhibitions, which, in their hands, constituted the essence of their religion. From these the vulgar and profane were prohibited by the most rigorous penalties. The Egyptians, and indeed all the ancients without exception, deemed the mysteries of religion too sacred and solemn to be communicated to the herd of mankind, naked and unreserved; a mode by which they imagined those sacred and sublime oracles would have been defiled and degraded. *Procul, o procul este profani —Odi profanum vulgus et arceo.* Egypt was the land of graven images; allegory and mythology were the veil which concealed religion from the eyes of the vulgar; fable was the ground-work of that impenetrable covering.

In the earliest and most unpolished state of society we cannot suppose fable to have existed among men. Fables are always tales of other times, but at this period other times did not reach far enough backward to afford those fruits of the imagination sufficient time to arrive at maturity. Fable requires a considerable space of time to acquire credibility, and to rise into reputation. Accordingly, we find that both the Chinese and Egyptians, the two most ancient nations whose annals have reached our times, were altogether unacquainted with fabulous details in the most early and least improved periods of their respective monarchies. It has been shown almost to a demonstration, by a variety of learned men, that both the one and the other people, during some centuries after the general deluge, retained and practised the primitive Noachic religion, in which fable and fancy could find no place; all was genuine unsophisticated truth.

As soon as the authentic tradition concerning the origin of the universe was either in a good measure lost, or at least adulterated by the inventions of men, fable and fiction began to prevail. The Egyptian Thoth or Thyoth, or Mercury Trismegistus, and Mochus the Phœnician, undertook to account for the formation and arrangement of the universe, upon principles purely mechanical. Here fable began to usurp the place of genuine historical truth. Accordingly, we find that all the historians of antiquity, who have undertaken to give a general detail of the affairs of the world, have ushered in their narration with a fabulous cosmogony. Here imagination ranged unconfined over the boundless extent of the primary chaos. To be convinced of the truth of this assertion, we need only look into Sanchoniathon's Cosmogony, Euseb. Præp. Evang. l. 1. sub init. and Diodorus Sic. l. 1. From this we suppose it will follow, that the first race of fables owed their birth to the erroneous opinions of the formation of the universe.

Having now endeavoured to point out the origin of mythology, or fabulous traditions, we shall proceed to lay before our readers a brief detail of the mythology of the most respectable nations of antiquity, following the natural order of their situation.

According to the Chinese accounts, Fohe or Fohi laid the foundation of that empire about 4000 years ago. This emperor, according to the Chinese, was conceived in a miraculous manner. His mother, say they, one day as she was walking in a desert place, was surrounded by a rainbow; and, being impregnated by this meteor, was in due time delivered of that celebrated legislator. This personage, like the Athenian Cecrops, was half a man and half a serpent. His intellectual powers were truly hyperbolical. In one day he discovered 50 different species of poisonous herbs. He taught his countrymen the whole art of agriculture in the space of a very few years. He instructed them how to sow five different sorts of grain He invented boats and nets for fishing, the art of fabricating porcelain, the management of silk-worms, the manufacturing of silk, &c. In a word, that wonderful personage was inspired by Heaven with knowledge, which qualified him for composing that incomparable body of laws which are even at this day the wonder of the world. Our readers will admit, that this whole detail is fabulous and chimerical. The most learned part of them will readily observe, that the Chinese, in ascribing the invention of all the useful arts to their Fohi, are perfectly agreed with almost all the other nations of antiquity. The Indians ascribe every invention to Budha, or Vishnou, or Foe; the Persians to Zerdusht or Zoroastres; the Chaldeans to their man of the sea, whom they call Oannes; the Egyptians to Thoth or Thyoth; the Phœnicians to Melicerta; the Greeks to the family of the Titans; and the Scandinavians to Odin; &c.

About 551 years before the Christian æra, appeared the famous Chinese philosopher Con-fu-tse, or Confucius. Concerning the birth of this prince of philosophers, the Chinese have propagated the following legendary tale. His mother walking in a solitary place was impregnated by the vivifying influence of the Heavens. The babe, thus produced, spake and reasoned as soon as it was born. Confucius, however, wrought no miracles, performed no romantic exploits, but lived an austere ascetic life, taught and inculcated the doctrines of pure morality, and died, remarkable only for superior wisdom, religious, moral, and political.

About the year of Christ 601, flourished the sectary Laokiun. His mother carried him 30 years in her womb, and was at last delivered of him under a plum-tree. This philosopher was the Epicurus of the Chinese. His disciples, who were denominated Tao-sse, i. e heavenly doctors, were the first who corrupted the religion of the Chinese. They were addicted to magic, and introduced the worship of good and bad dæmons. Their doctrine was embraced by a long succession of emperors. One of these princes, called You-ti, had been deprived by death of a favourite mistress, whom he loved with the most extravagant passion. The

emperor, by the magical skill of one of these doctors, obtained an interview with his deceased mistress, a circumstance which rivetted the whole order in the affection and esteem of the deluded prince. Here our readers will observe the exact counterpart of the fable of Eurydice, so famous in the mythology of the Greeks and Romans. That such a system of religious principles must have abounded with mythological adventures is highly probable; but as the missionaries, to whom we are chiefly indebted for our information relating to the religion of the Chinese, have not taken the pains to record them, we find it impossible to gratify the curiosity of our readers on that head.

The worship of the idol Fo, or Foe, was transplanted from India into China about the 56th year of the Christian æra, upon the following occasion. One of the doctors of the Fao-sse had promised a prince of the family of Tchou, and brother of the emperor Ming-ti, to make him enter into communion with the spirits. At his solicitation an ambassador was dispatched into India, in order to enquire where the true religion was to be found. There had been a tradition, say the missionaries, ever since the age of Confucius, that the true religion was to be found in the west.—The ambassador stopt short in India; and finding that the god Foe was in high reputation in that country, he collected several images of that deity painted on chintz, and with it 42 chapters of the canonical books of the Hindus, which, together with the images, he laid on a white elephant, and transported into his native country. At the same time he imported from the same quarter the doctrine of the transmigration of souls, which is firmly believed in China to this day. The doctrine and worship of Foe, thus introduced, made a most rapid progress all over China, Japan, Siam, &c. The priests of Foe are called among the Siamese, Talopoins; by the Tartars, Lamas; by the Chinese, Ho-charg; and by the people of Japan, Bonzes. By this last appellation they are generally known in Europe.

An infinitude of fable was invented and propagated by the disciples of Foe, concerning the life and adventures of their master. If the earlier ages of the Chinese history are barren of mythological incidents, the later periods, after the introduction of the worship of Foe, furnish an inexhaustible store of miracles, monsters, fables, intrigues, exploits, and adventures, of the most villanous complexion. Indeed, most of them are so absurd, so ridiculous, and at the same time so impious and profane, that we are convinced our readers will easily dispense with a detail from which they could reap neither entertainment nor instruction. Such as may find themselves disposed to rake into this abominable puddle we must refer to the reverend fathers Du Halde, Couplet, Amiot, Kircher, and other members of the propaganda, in whose writings they will find wherewithal to satisfy, and even to surfeit, their appetite.

The Hindus, like the other nations of the East, for a long time retained the worship of the true God. At length, however, idolatry broke in, and, like an impetuous torrent, overwhelmed the country. First of all, the genuine history of the origin of the universe was either utterly lost, or disguised under a variety of fictions and allegories. We are told that Brimha, the supreme divinity of the Hindus, after three several efforts, at last succeeded in creating four persons, whom he appointed to rule over all the inferior creatures.—Afterwards Brimha joined his efficient power with Bishon and Rulder; and by their united efforts they produced ten men, whose general appellation is Munies, that is, the inspired. The same being, according to another mythology, produced four other persons, as imaginary as the former; one from his breast, one from his back, one from his lip, and one from his heart. These children were denominated Bangs; the' import of which word we cannot pretend to determine. According to another tradition, Brimha produced the Bramins from his mouth, to pray, to read, to instruct; the Chiltern from his arms, to draw the bow, to fight, to govern; the Bice from his belly or thighs, to nourish, to provide the necessaries of life by agriculture and commerce; the Sodor from his feet, for subjection, to serve, to labour, to travel. The reader will see at once, in these allegorical persons, the four casts or septs into which the Hindu nations have, time immemorial, been divided. These are some of their most celebrated mythological traditions with relation to the origin of the universe.

The Hindus have likewise some mythological opinions which seem to relate to the general deluge. They tell us, that desiring the preservation of herds and of brahmans, of genii and of virtuous men, of vedas of law, and of precious things, the Lord of the universe assumes many bodily shapes; but though he pervades, like the air, a variety of beings, yet he is himself unvaried, since he has no quality in him subject to change. At the close of the last calpa, there was a general destruction, occasioned by the sleep of Brahme, whence his creatures in different worlds were drowned in a vast ocean. Brahme being inclined to slumber after a lapse of so many ages, the strong dæmon Hayagri-va came near him, and stole the vedas which had flowed from his lips. When Heri, the preserver of the universe, discovered this deed of the prince of Dainavas, he took the shape of a minute fish called Sap-hari. After various transformations, and an enormous increase of size in each of them, the Lord of the universel oving the righteous man, who had still adhered to him under all these various shapes, and intending to preserve him from the sea of destruction caused by the depravity of the age, thus told him how he was to act: "In seven days from the present time, O thou tamer of enemies! the three worlds will be plunged in an ocean of death; but in the midst of the destroying waves a large vessel sent by me for thy use shall stand before thee." The remaining part of the mythology so nearly resembles the Mosaic history of Noah and the general deluge, that the former may be a strong confirmation of the truth of the latter. To dry up the waters of the deluge, the power of the Deity descends in the form of a boar, the symbol of strength, to draw up and support on its tusks the whole earth, which had been sunk beneath the ocean. Again, the same power is represented as a tortoise sustaining the globe, which had been convulsed by the violent assaults of dæmons, while the gods charmed the sea, with the mountain Mandar, and forced it to disgorge the sacred things and animals, together with the water of life which it had swallowed. All these stories, we think, relate to the same event, shadowed by a moral, a metaphysical, and an astronomical allegory; and all three seem connected with the hieroglyphical sculptures of the old Egyptians.

The Hindus divide the duration of the world into four Yugs or Jugs, or Jogues, each consisting of a prodigious number of years. In each of those periods, the age and stature of the human race have been gradual diminished; and in each of them mankind has gradually declined in virtue and piety, as well as in age and stature. The present period they call the Collæ, i. e. the corrupt Jogue, which they say is to last 400,000 years, of which near 5000 years are already past. In the last part of the preceding Jogue, which they call the Dwa paar, the age of man was contracted into 1000 years, as in the present it is confined to 100. From this proportional diminution of the length of the human life, our readers will probably infer, that the two last Jogues bear a pretty near resemblance to the Mosaic history of the age of the antediluvian and postdiluvian patriarchs; and that the two first are imaginary periods prior to the creation of the world, like those of the Chinese, Chaldeans, and Egyptians.

According to the mythology of the Hindus, the system of the world is subject to various dissolutions and resuscitations. At the conclusion of the Collie Jogue, say they, a grand revolution will take place, when the solar system will be consumed by fire, and all the elements reduced to their original constituent atoms. Upon the back of these revolutions, Brimha, the supreme deity of the Hindus, is sometimes represented as a new-born infant, with his toe in his mouth, floating on a camala or water flower, sometimes only on a leaf of that plant, on the surface of the vast abyss. At other times he is figured as coming forth of a winding shell; and again as blowing up the mundane foam with a pipe at his mouth. Some of these emblematical figures and attitudes, our learned readers will probably observe, nearly resemble those of the ancient Egyptians.

But the vulgar religion of the ancient Hindus was of a very different complexion, and opens a large field of mythological adventures. We have observed above, that the Fo or Foe of the Chinese was imported from India; and now we shall give a brief detail of the mythological origin of that divinity. We have no certain account of the birth place of this imaginary deity.—His followers relate, that he was born in one of the kingdoms of India near the line, and that his father was one of that country. His mother brought him into the world by the left side; and expired soon after the delivery. At the time of her conception, she dreamed that she had swallowed a white elephant; a circumstance which is supposed to have given birth to the veneration which the kings of India have always shown for a white animal of that species. As soon as he was born, he had strength enough to stand erect without assistance. He walked abroad at seven, and, pointing with one hand to the heavens, and with the other to the earth, he cried out, "In the heavens, and on the earth, there is no one but me who deserves to be honoured." At the age of 30, he felt himself all on a sudden filled with the divinity; and now he was metamorphosed into Fo or Pagod, according to the expression of the Hindus. He had no sooner declared himself a divinity, than he thought of propagating his doctrine, and proving his divine mission by miracles. The number of his disciples was immense; and they soon spread his dogmas over all India, and even to the higher extremities of Asia.

One of the principal doctrines which Fo and his disciples propagated, was the metempsychosis or transmigration of souls. This doctrine, some imagine, has given rise to the multitude of idols reverenced in every country where the worship of Fo is established. Quadrupeds, birds, reptiles, and the vilest animals, had temples erected for them; because, say they, the soul of the god, in his numerous transmigrations, may have, at one time or other, inhabited their bodies.

Both the doctrine of transmigration and of the worship of animals seems, however, to have been imported from Egypt into India. If the intercourse between these two countries was begun at so early a period as some very late writers have endeavoured to prove, such a supposition is by no means improbable. The doctrine of the transmigration of souls was early established among the Egyptians. It was, indeed, the only idea they formed of the soul's immortality. The worship of animals among them seems to have been still more ancient. If such an intercourse did actually exist, we may naturally suppose that colonies of Egyptian priests found their way into India, as they did afterwards into Asia Minor, Italy, and Greece. That colonies of Egyptians did actually penetrate into that country, and settle there, many centuries before the Nativity, is a fact that cannot be called in question, for reasons which the bounds prescribed us on this article will not allow us to enumerate. We shall only observe, that from the hieroglyphical representations of the Egyptian deities seem to have originated those monstrous idols which from time immemorial have been worshipped in India, China, Japan, Siam, and even in the remotest parts of Asiatic Tartary.

Foe is often called Budha, Budda, and sometimes Vishnou; perhaps, indeed, he may be distinguished by many other names, according to the variety of dialects of the different nations among which his worship was established. An infinitude of fables was propagated by his disciples concerning him after his death. They pretended that their master was still alive; that he had been already born 8000 times; and that he had successively appeared under the figure of an ape, a lion, a dragon, an elephant, a boar, &c. These were called the incarnations of Vishnou. At length he was confounded with the supreme God; and all the titles, attributes, operations, perfections and ensigns of the Most High were ascribed to him. Sometimes he is called Amida, and represented with the head of a dog, and worshipped as the guardian of mankind. He sometimes appears as a princely personage, issuing from the mouth of a fish. At other times, he wears a lunette on his head, in which are seen cities, mountains, towers, trees, in short, all that the world contains. These transformations are evidently the children of allegorical or hieroglyphical emblems, and form an exact counterpart to the symbolical worship of the Egyptians.

The enormous mass of mythological traditions which have in a manner deluged the vast continent of India would fill many volumes: we have selected the preceding articles as a specimen only, by which our readers may be qualified to judge of the rest. If they find themselves disposed to indulge their curiosity at greater length, we must remit them to Thevenot's and Hamilton's Travels, to Mons. Aquetil in his Zond. Avesta; Halhed's Introduction to his translation of the Code of Gentoo Laws; Col. Dow's History of Hindostan; Grose's Voyage to the East Indies; Asiatic Researches, vol. I. and II.

The mythology of the Persians is, if possible, still more extravagant than that of the Hindus. It supposes the world to have been repeatedly destroyed, and repeopled by creatures of different formation, who were successively annihilated or banished for their disobedience to the Supreme Being. The monstrous griffin Simergh tells the hero Caherman that she had already lived to see the earth seven times filled with creatures, and seven times a perfect void; that before the creation of Adam, this globe was inhabited by a race of beings called Peri and Dives, whose character formed a perfect contrast. The Peri are described as beautiful and benevolent; the Dives as deformed, malevolent, and mischievous, differing from infernal demons only in this, that they are not as yet confined to the pit of hell. They are for ever ranging over the world, to scatter discord and misery among the sons of men. The Peri nearly resemble the fairies of Europe; and perhaps the Dives gave birth to the giants and magicians of the middle ages. The Peri and Dives wage incessant wars; and when the Dives make any of the Peri prisoners, they shut them up in iron cages, and hang them on the highest trees, to expose them to public view, and to the fury of every chilling blast.

When the Peri are in danger of being overpowered by their foes, they solicit the assistance of some mortal hero; which produces a series of mythological adventures, highly ornamental to the strains of the Persian bards, and which, at the same time, furnishes an inexhaustible fund of the most diversified machinery.

One of the most celebrated adventurers in the mythology of Persia is Tahmurus, one of their most ancient monarchs. This prince performs a variety of exploits, while he endeavours to recover the fairy Merjan. He attacks the Dive Demrush in his own cave; where, having vanquished the giant or demon, he finds vast piles of hoarded wealth: these he carries off with the fair captive. The battles, labours, and adventures of Rostan, another Persian worthy, who lived many ages after the former, are celebrated by the Persian bards with the same extravagance of hyhyperbole with which the labours of Hercules have been sung by the poets of Greece and Rome.

The adventures of the Persian heroes breathe all the wildness of achievement recorded of the knights of Gothic romance. The doctrine of enchantments, transformations, &c exhibited in both, is a characteristic symptom of one common original. Persia is the genuine classic ground of eastern mythology, and the source of the ideas of chivalry and romance; from which they were propagated to the regions of Scandinavia, and indeed to the remotest corners of Europe towards the west.

Perhaps our readers may be of our opinion, when we offer it as a conjecture, that the tales of the war of the Peri and Dives originated from a vague tradition concerning good and bad angels: nor is it, in our opinion, improbable, that the fable of the wars between the gods and giants, so famous in the mythology of Greece and Italy, was imported into the former of these countries from the same quarter. For a more particular account of the Persian mythology, our readers may consult Dr. Hyde de Relig. vet. Pers. Medor, &c.; D'Herbelot's Bibl. Orient. and Mr. Richardson's Introduction to his Persian and Arabic Dictionary.

The mythology of the Chaldeans, like that of the other nations of the East, commences at a period myriads of years prior to the æra of the Mosaic creation. Their cosmogony, exhibited by Berosus, who was a priest of Belus, and deeply versed in the antiquities of his country, is a piece of mythology of the most extravagant nature. It has been copied by Eusebius (Chron. l. i. p. 5.); it is likewise to be found in Syncellus, copied from Alexander Polyhistor. According to this historian, there were at Babylon written records preserved with the greatest care, comprehending a period of fifteen myriads of years. Those writings likewise contained a history of the heavens and the sea, of the earth, and of the origin of mankind. "In the beginning (says Berosus, copying from Oannes, of whom we shall give a brief account below) there was nothing but darkness and an abyss of water, wherein resided most hideous beings produced from a twofold principle. Men appeared with two wings; some with two and some with four faces. They had one body, but two heads; the one of a man, the other of a woman. Other human figures were to be seen, furnished with the legs and horns of goats. Some had the feet of horses behind, but before were fashioned like men, resembling hippocentaurs." The remaining part of this mythology is much of the same complexion; indeed so extravagant, that we imagine our readers will readily enough dispense with our translating the sequel. "Of all these (says the author) were preserved delineations in the temple of Belus at Babylon. The person who was supposed to preside over them was called Omorca. This word, in the Chaldean language, is Thalath, which the Greeks call Θαλασσα, but it more properly imports the moon. Matters being in this situation, their god (says Eusebius), the god (says Syncellus) came and cut the woman asunder; and out of one half of her he formed the earth, and out of the other he made the heavens; and, at the same time, he destroyed the monsters of the abyss." This whole mythology is an allegorical history copied from hieroglyphical representations, the real purport of which could not be decyphered by the author. Such, in general, were the consequences of the hieroglyphical style of writing.

Oannes the great civilizer and legislator of the Chaldeans, according to Apollodorus, who copied from Berosus, was an amphibious animal of a heterogeneous appearance. He was endowed with reason, and a very uncommon acuteness of parts. His whole body resembled a fish. Under the head of a fish he had also another head, and feet below similar to those of a man, which were subjoined to the tail of the fish. His voice and language were articulate and perfectly intelligible, and there was a figure of him still extant in the days of Berosus. He made his appearance in the Erythrean or Red Sea, where it borders upon Babylonia. This monstrous being conversed with men by day; but at night he plunged into the sea, and remained concealed in the water till next morning. He taught the Babylonians the use of letters and the knowledge of all the arts and sciences. He instructed them in the method of building houses, constructing temples, and all other edifices. He taught them to compile laws and religious ceremonies, and explained to them the principles of mathematics, geometry, and astronomy. In a word, he communicated to them every thing necessary, useful, and ornamental: and so universal were his instructions, that not one single article had ever been added to them since the

time they were first communicated. Helladius is of opinion that this strange personage, whoever he was, came to be represented under the figure of a fish, not because he was actually believed to be such, but because he was clothed with the skin of a seal. By this account our readers will see that the Babylonian Oannes is the exact counterpart of the Fohi of the Chinese, and the Thyoth or Mercury Trismegistus of the Egyptians. It is likewise apparent, that the idea of the monster compounded of the man and the fish has originated from some hieroglyphic of that form grafted upon the appearance of man. Some modern mythologists have been of opinion, that Oannes was actually Noah the great preacher of righteousness; who, as some think, settled in Shinar or Chaldea after the deluge, and who, in consequence of his connection with that event, might be properly represented under the emblem of the Man of the Sea.

The nativity of Venus, the goddess of beauty and love, is another piece of mythology famous among the Babylonians and Assyrians. An egg, say they, of a prodigious size, dropped from heaven into the river Euphrates. Some doves settled upon this egg, after that the fishes had rolled it to the bank. In a short time this egg produced Venus, who was afterwards called the Dea Syria, the Syrian goddess. In consequence of this tradition (says Hyginus), pigeons and fishes became sacred to this goddess among the Syrians, who always abstained from eating the one or the other. Of this imaginary being we have a very exact and entertaining history in the treatise De Dea Syria, generally ascribed to Lucian.

In this mythological tradition our readers will probably discover an illusion to the celebrated Mundane egg; and at the same time the story of the fishes will lead them to anticipate the connection between the sea and the moon. This same deity was the Atargatis of Ascalon, described by Diodorus the Sicilian; the one half of her body a woman, and the other a fish. This was no doubt a hieroglyphic figure of the moon, importing the influence of that planet upon the sea and the sex. The oriental name of this deity evidently points to the moon; for it is compounded of two Hebrew words, which import "the queen of the host of heaven."

The fable of Semiramis is nearly connected with the preceding one. Diodorus Siculus has preserved the mythological history of this deity, which he and all the writers of antiquity have confounded with the Babylonian princess of the same name. That historian informs us, that the word Semiramis, in the Syrian dialect, signifies "a wild pigeon;" but we apprehend that this term was a name or epithet of the moon, as it is compounded of two words of an import naturally applicable to the lunar planet. It was a general practice among the Orientals to denominate their sacred animals from that deity to which they were consecrated. Hence the moon being called Simiramis, and the pigeon being sacred to her divinity, the latter was called by the name of the former.

As the bounds prescribed this article renders it impossible for us to do justice to this interesting piece of mythology, we must beg leave to refer our readers for farther information to Diod. Sic. l. ii. Hyginus Poet. Astron. fab. 197. Pharnutus de Nat. Deor. Ovid. Metam. l. iv. Athen. in Apol. Izetzes Chil. ix. cap. 275. Seld. de Diis Syr. Syrit. ii. p. 183.

We should now proceed to the mythology of the Arabians, the far greatest part of which is, however, buried in the abyss of ages; though, when we reflect on the genius and character of that people, we must be convinced that they too, as well as the other nations of the East, abounded in fabulous relations and romantic compositions. The natives of that country have always been enthusiastically addicted to poetry, of which fable is the essence. Wherever the muses have erected their throne, fables and miracles have always appeared in their train. In the Koran we meet with frequent allusions to well-known traditionary fables. These had been transmitted from generation to generation by the bards and rhapsodists for the entertainment of the vulgar. In Arabia, from the earliest ages, it has always been one of the favourite entertainments of the common people to assemble in the serene evenings around their tents, or on the platforms with which their houses are generally covered, or in large halls erected for the purpose, in order to amuse themselves with traditional narrations of the most distinguished actions of their most remote ancestors. Oriental imagery always embellished their romantic details. The glow of fancy, the love of the marvellous, the propensity towards the hyperbolical and the vast, which constitute the essence of oriental description, must ever have drawn the relation aside into the devious regions of fiction and fairyland. The religion of Mahomet beat down the original fabric of idolatry and mythology together. The Arabian fables current in modern times are borrowed or imitated from Persian compositions; Persia being still the grand nursery of romance in the East.

In Egypt we find idolatry, theology, and mythology, almost inseparably blended together. The inhabitants of this region, too, as well as of others in the vicinity of the centre of population, adhered for several centuries to the worship of the true God. At last, however, conscious of their own ignorance, impurity, imperfection, and total unfitness to approach an infinitely perfect being, distant, as they imagined, and invisible, they began to cast about for some beings more exalted and more perfect than themselves, by whose mediation they might prefer their prayers to the supreme majesty of heaven. The luminaries of heaven, which they imagined were animated bodies, naturally presented themselves. These were splendid and glorious beings. They were thought to partake of the divine nature: they were revered as the satraps, prefects, and representatives of the supreme Lord of the universe. They were visible, they were beneficent; they dwelt nearer to the gods, they were near at hand, and always accessible. These were, of course, employed as mediators and intercessors between the supreme divinity and his humble subjects of this lower world. Thus employed, they might claim a subordinate share of worship, which was accordingly assigned them. In process of time, however, that worship, which was originally addressed to the supreme Creator by the mediation of the heavenly bodies, was in a great measure forgotten, and the adoration of mankind ultimately terminated on those illustrious creatures. To this circumstance, we think, we may ascribe

the origin of that species of idolatry called Sabaeism, or the worship of the host of heaven, which overspread the world early and almost universally. In Egypt this mode of worship was adopted in all its most absurd and most enthusiastic forms; and at the same time the most heterogeneous mythology appeared in its train. The mythology of the ancient Egyptians was so various and multiform, so complicated and so mysterious, that it would require many volumes even to give a superficial account of its origin and progress, not only in its mother country, but even in many other parts of the eastern and western world. Besides, the idolatry and mythology of that wonderful country are so closely connected and so inseparably blended together, that it is impossible to describe the latter without at the same time developing the former. We hope, therefore, our readers will not be disappointed if, in a work of this nature, we touch only upon some of the leading or most interesting articles of this complicated subject.

The Egyptians confounded the revolutions of the heavenly bodies with the reigns of their most early monarchs. Hence the incredible number of years included in the reign of their eight superior gods, who, according to them, filled the Egyptian throne successively in the most early periods of time. To these, according to their system, succeeded twelve demigods, who likewise reigned an amazing number of years. These imaginary reigns were no other than the periodical revolutions of the heavenly bodies preserved in their almanacks, which might be carried back, and actually were carried back, at pleasure. Hence the fabulous antiquity of that kingdom. The imaginary exploits and adventures of these gods and demigods furnished an inexhaustible fund of mythological romances. To the demigods succeeded the kings of the cynic cycle, personages equally chimerical with the former. The import of this epithet has greatly perplexed critics and etymologists. We apprehend it is an oriental word importing royal dignity, elevation of rank. This appellation intimated, that the monarchs of that cycle, admitting that they actually existed, were more powerful and more highly revered than their successors. After the princes of the cynic cycle comes another race, denominated Nekyes, a title likewise implying royal, splendid, glorious. These cycles figure high in the mythological annals of the Egyptians, and have furnished materials for a variety of learned and ingenious disquisitions. The wars and adventures of Osiris, Orus, Typhon, and other allegorical personages who figure in the Egyptian rubric; the wanderings of Isis, the sister and wife of Osiris; the transformation of the gods into divers kinds of animals; their birth, education, peregrinations, and exploits; compose a body of mythological fictions so various, so complicated, so ridiculous, and often so apparently absurd, that all attempts to develope and explain them have hitherto proved unsuccessful. All, or the greatest part, of those extravagant fables are the offspring of hieroglyphical or allegorical emblems devised by the priests and sages of that nation, with a view to conceal the mysteries of their religion from that class of men whom they stigmatized with the name of the uninitiated rabble.

The worship of brute animals and of certain vegetables, universal among the Egyptians, was another exuberant source of mythological adventures. The Egyptian priests, many of whom were likewise profound philosophers, observed, or pretended to observe, a kind of analogy between the qualities of certain animals and vegetables, and those of some of their subordinate divinities. Such animals and vegetables they adopted, and consecrated to the deities to whom they were supposed to bear this anological resemblance; and in process of time they considered them as the visible emblems of those divinities to which they were consecrated. By these the vulgar addressed their archetypes: in the same manner, as in other countries, pictures and statues were employed for the very same purpose. The mob, in process of time, forgetting the emblematical character of those brutes and vegetables, addressed their devotion immediately to them; and of course these became the ultimate objects of vulgar adoration.

After that these objects, animate or inanimate, were consecrated as the visible symbols of the deities, it soon became fashionable to make use of their figures to represent those deities to which they were consecrated. This practice was the natural consequence of the hieroglyphical style which universally prevailed among the ancient Egyptians. Hence Jupiter Ammon was represented under the figure of a ram, Apis under that of a cow, Osiris of a bull, Pan of a goat, Thoth or Mercury of an ibis, Bubastis or Diana of a cat, &c. It was likewise a common practice among those deluded people to dignify these objects, by giving them the names of those deities which they represented. By this mode of dignifying these sacred emblems, the veneration of the rabble was considerably enhanced, and the ardour of their devotion inflamed in proportion. From these two sources, we think, are derived the fabulous transformations of the gods, so generally celebrated in the Egyptian mythology, and from it imported into Greece and Italy. In consequence of this practice, their mythological system was rendered at once enormous and unintelligible.

Their Thoth, or Mercury Trismegistus, was, in our opinion, the inventor of this unhappy system. This personage, according to the Egyptians, was the original author of letters, geometry, astronomy, music, architecture; in a word, of all the elegant and useful arts, and of all the branches of science and philosophy. He it was who first discovered the analogy between the divine affections, influences, appearances, operations, and the corresponding properties, qualities, and instincts of certain animals, and the propriety of dedicating particular kinds of vegetables to the service of particular deities.

The priests, whose province it was to expound the mysteries of that allegorical hieroglyphical religion, (see MYSTERY), gradually lost all knowledge of the primary import of the symbolical characters. To supply this defect, and at the same time to veil their own ignorance, the sacerdotal instructors had recourse to fable and fiction. They heaped fable upon fable, till their religion became an accumulated chaos of mythological absurdities.

Two of the most learned and most acute of the ancient philosophers have attempted a rational explication of the latent import of the Egyptian mythology; but both have failed in the attempt; nor have the moderns, who have laboured in the same department, performed their part with much

better success. Instead, therefore, of prosecuting this inexplicable subject, which would swell this article beyond all proportion, we must beg leave to refer those who are desirous of further information to the following authors, where they will find enough to gratify their curiosity, if not to inform their judgment: Herodotus, lib. ii. Diodorus Siculus, lib. 1. Plut. Isis & Osiris; Jamblichus de Myst. Ægypt. Horapollo Hieroglyph. Egypt. Macrob. Sat. cap. 23. among the ancients: and among the moderns, Kircher's Œdip. Voss. de Origin. et Prog. Idol. Mr. Bryant's Analysis of Anc. Mythol. Mons. Gebelin, Monde prim.; and above all, to the learned Jablonski's Panth. Ægyptiorum.

The elements of Phœnician mythology have been preserved by Eusebius, Præp. Evang. sub init. In the large extract which that learned father hath copied from Philo Biblius's translation of Sanchoniatho's history of Phœnicia, we are furnished with several articles of mythology. Some of these throw considerable light on several passages of the sacred history; and all of them are strictly connected with the mythology of the Greeks and Romans. There we have preserved a brief but entertaining detail of the fabulous adventures of Uranus, Cronus, Dagon, Thyoth or Mercury, probably the same with the Egyptian hero of that name. Here we find Muth or Pluto, Æphcestus or Vulcan, Æsculapius, Nereus, Poseedon or Neptune, &c. Astarte, or Venus Urania, makes a conspicuous figure in the catalogue of Phœnician worthies; Pallas or Minerva is planted on the territory of Attica; in a word, all the branches of the family of the Titans, who in after ages figured in the rubric of the Greeks, are brought upon the stage, and their exploits and adventures briefly detailed.

By comparing this fragment with the mythology of the Atlantidæ and that of the Cretans preserved by Diodorus the Sicilian, lib. v. we think there is good reason to conclude, that the family of the Titans, the several branches of which seem to have been both the authors and objects of a great part of the Grecian idolatry, originally emigrated from Phœnicia.

As for the mythology of the Greeks and Romans, the illustrations of it which are given under various separate articles in this work are such as will, we conceive, render any more detailed account in this place entirely unnecessary.

MYTILUS. Mussel. In zoology, a genus of the class vermes, order testacea. Animal allied to an ascidia; shell bivalve, rough, generally affixed by a byssus or beard of silky filaments; hinge mostly without teeth, with generally a subulate, excavated, longitudinal line. Sixty-four species, scattered through the seas of the globe; eleven common to the coasts of our own country. They may be thus subdivided.

A. Parasitical: affixed as though by claws. Three species; of which the following is an example.

1. M. Crista galli. Shell plaited, spinous; both lips rough: offering four or five varieties. Inhabits the Indian ocean and Red sea, affixed to gorgonia; colour of the shell purple-violet, pale cinnamon or bay; rough, with raised dots; within, honey-colour; nearly equivalve, closed with five, eight, or ten oblique or straight acute plaits; hollow at the hinge, triangular.

B. Flat, or compressed into a flattened form, and slightly eared. Two species: of which the following is an example.

2. M. margaritiferus. Pearl mussel. Shell flattened, nearly orbicular, with a transverse base imbricate, with toothed tunics. Inhabits American and Indian seas; about eight inches long, and something broader: the inside is beautifully polished, and produces the true mother-of-pearl, and frequently most valuable pearls; the outside sometimes sea-green, or chesnut or bloom-colour with white rays, or whitish with green rays; when the outer coat is removed, it has the same perlaceous lustre as the inside: the younger shells have ears as long as the shells, and resemble scallops.

C. Ventricose or convex: including all the rest. The following are examples:

3. M. edulis. Edible mussel. Shell smoothish, violet, the valves slightly recurved on the obtuse side, and somewhat angular on the acute side: beaks pointed: shape nearly triangular; covered with a brownish skin; the colour below sometimes instead of violet, yellowish, or striped with pale rays. Inhabits the British coasts, European and Indian seas: generally from two to three inches long; but is much larger within the tropics, and smaller more northerly; found in large beds, and generally adhering to other bodies by means of a long silky beard: the fish affords a rich food, but is often extremely noxious to many constitutions.

4. M. anatinus. Duck mussel. Shell oval, a little compressed, very brittle, and semi-transparent, with a membranaceous margin; beaks decuticated. Inhabits the fresh waters of Great Britain, and of other parts of Europe: about five inches long and two and a quarter broad; the colour of the shell greenish with very fine striæ parallel with the aperture and a few blackish wrinkles; within glossy white, blue or yellowish, and sometimes shining with iridescent colours. Ducks and crows are extremely fond of this and M. cygneus, (a broader species found in rivers and ponds): and the crows, when the shell is too hard for their bills, fly with it to a great height, drop the shell on a rock, and pick out the meat after the shell is broken by the fall.

According to the observation of M. Mery, of the Paris academy, confirmed by observations of other naturalists, the mussel, in all its species, is androgynous: and that from a peculiar generative organization, each individual is of itself capable of propagating its species, and annually does so without any intercourse with any other individual; a mode of increase very different from what occurs in snails, earth-worms, and other androgynous or hermaphroditic animals. The mussel lays it eggs in the spring: these are minute, and are placed by the parent in due order in a very close arrangement, on the outside of the shell, where by means of a gluey matter they adhere very fast, and continually increase in size and strength, till becoming perfect mussels they fall off and shift for themselves, leaving the holes where they were placed,

behind them: two or three thousand such holes are sometimes found on a single shell; which seems to prove an enormous fertility in this animal.

The mussel is infested by several enemies in its own element: one of the most cruel is a shell-fish of the trochus kind. This animal attaches itself to the shell of the mussel, pierces it with a round hole, and introduces a peculiar tube five or six inches long, which it turns in a spiral direction, and with which it sucks the substance of the mussel.

MYTTOTON, a coarse kind of food, used by the labouring people among the Greeks, and sometimes among the Romans. It was made of garlic, onions, eggs, cheese, oil, and vinegar, and reckoned very wholesome.

MYUS (anc. geog.), one of the twelve towns of Ionia; seated on the Meander, at the distance of 30 stadia from the sea. In Strabo's time it was incorporated with the Milesians, on account of the paucity of its inhabitants, from its being formerly overwhelmed with water; for which reason the Ionians consigned its suffrage and religious ceremonies to the people of Miletus. Artaxerxes allotted this town to Themistocles, in order to furnish his table with meat: Magnesia was to support him in bread, and Lampsacus in wine. The town now lies in ruins.

N, A liquid consonant, or semivowel, and the thirteenth letter of the Greek, Latin, English, &c. alphabets.

The N is a nasal consonant: its sound is that of a d, passed through the nose: so that when the nose is stopped by a cold, or the like, it is usual to pronounce d for *n*. M. l'Abbe de Dangeau observes, that in the French the *n* is frequently a mere nasal vowel, without any thing of the sound of a consonant in it. He calls it the Sclavonic vowel. The Hebrews call their *N*, *Nun*, which signifies child, as being supposed the offspring of M; partly on account of the resemblance of sound, and partly on that of the figure. Thus from the m, by omitting the last column, is formed *n*: and thus from the capital *N*, by omitting the first column, is formed the Greek minuscule ν. Hence, for Biennius, &c. the Latins frequently use Bimus, &c. and the same people convert the Greek ν at the end of a word into an m; as, φαρμακον, *pharmacum*, &c. See M.

N before p, b, and m, the Latins change into m, and frequently into l and r, as in *ludo*, *illudo*; in *rigo*, *irrigo*, &c. in which they agree with the Hebrews, who, in lieu of Nun, frequently double the following consonant; and the Greeks do the same, as when for Manlius, they write Μαλλιος, &c.

The Greeks, also, before κ, γ, χ, ν, changed the ν into γ: in which they were followed by the ancient Romans, who for *Angulus* wrote *Aggulus*; for *anceps*, *agceps*, &c. The Latins retrench the *n* from Greek nouns ending in ων; as λεων, *leo*; δρακων, *draco*. On the contrary, the Greeks add it to the Latin ones ending in ο: as Κατων, Νερων, for *Cato*, *Nero*.

In English, N has an invariable sound: as *no*, *name*, &c. After *m* it is sometimes almost lost, as *condemn*, &c.

N, among the ancients, was a numeral letter, signifying 900; according to the verse in Baronius,

N quoque nongentos numero designat habendos.

And when a line was struck over it $\bar{N}$, nine thousand.

Among the ancient lawyers, N. L. stood for *non liquet*, i. e. the cause is not clear enough to pass sentence upon.

N. P. was used among the Romans for *notarius publicus*; N. C. for Nero Cæsar, or Nero Claudius. N. B. is used for *nota bene*. In marine language, N stands for north.

N. or N°. in commerce, &c. is used as an abbrevation of *numero*, number. Thus also, in medicine, caryophyllorum, N°. vi. signifies six cloves. *N* on the French coins, denotes those struck at *Montpelier*.

NAAM, or Nam, Namium, in law, the taking or distraining another man's moveable goods. This is either lawful, or unlawful and prohibited.

Naam (Lawful), is a reasonable distress, proportionable to the value of the thing distrained for; and anciently called either *vif*, or *mort*, as it was made of quick, or dead chattel.

Lawful naam is so either by the common law, as when a man takes another's beasts doing damage in his ground; or by a man's particular fact, as on account of some contract, &c.

Naam (Unlawful), *vetitum namium*. See Namium.

NAAS, a borough of Ireland, in the county of Kildare, at which the assizes are held alternately with Athy. It was formerly the residence of the kings of Leinster. It is 17 miles S.W. of Dublin, and 26 N.W. of Leinster. Lon. 6. 42 W. Lat. 53. 13. N.

To NAB. *v.a.* (*nappa*, Swed.) To catch unexpectedly.

NABAL, a town of the kingdom of Tunis, celebrated for its potteries. Near it are several remains of antiquity. It is seated near the sea, 32 miles S.S.E. of Tunis. Lon. 10. 19 E. Lat. 53. 13 N.

NABIS, a celebrated tyrant of Lacedæmon, who, in all acts of cruelty and oppression, surpassed a Phalaris or a Dionysius. When he had exercised every art in plundering the citizens of Sparta, he made a statue, which was like his wife, and whenever any one refused to deliver up his riches, the tyrant led him to the statue, which immediately, by means of springs, seized him in its arms, and tormented him in the most excruciating manner with bearded points hid under the clothes. Nabis made an alliance with the Romans, defeated Philopœmen in a naval engagement; he was, however, himself defeated, in his turn, and treacherously murdered as he attempted to save his life by flight, B. C. 192, after an usurpation of 14 years.

NABLOUS, a town of Turkey in Asia, and capital of a country which was the ancient kingdom of Samaria. It is the residence of a scheick, who farms the tribute to the pacha of Damascus. The soil of the country is fertile, and produces a great deal of corn, cotton, olives, and some silk. The inhabitants are such zealous Mahometans, that they will not suffer any Christians to remain among them. Nablous is 24 miles N. of Jerusalem, and 90 S.S.W. of Damascus. Lon. 35. 24 E. Lat. 32. 20 N.

NABLUM, in Hebrew, *nebel*, an instrument of music among the Hebrews. The

Seventy, and the Vulgate, translate it sometimes by nablum, and at other times by psalterion, or lyra, or even cithara.

The nablum was a stringed instrument, very near the form of a Δ, which was played upon by both hands, and with a kind of bow. See Calmet's Dissertation concerning the Instruments of Music of the ancient Hebrews, prefixed to the second volume of his commentary upon the Psalms.

NABO, or NEBO, in mythology, a deity of the Babylonians, who possessed the next rank to Bel. It is mentioned by Isaiah, ch. xlviii. Vossius apprehends that Nabo was the moon, and Bel the sun; but Grotius supposes that Nabo was some celebrated prophet of the country, which opinion is confirmed by the etymology of the name, signifying, according to Jerome, one that presides over prophesy.

NABOB, properly NAVAB, the plural of naib, a deputy: as used in Bengal it is the same as nazim.

NABONASSAR, first king of the Chaldæans or Babylonians; memorable for the Jewish æra which bears his name, which is generally fixed in 3257, beginning on Wednesday February 26th in the 3967th of the Julian period, 747 years before Christ. The Babylonians revolting from the Medes, who had overthrown the Assyrian monarchy, did, under Nabonassar, found a dominion, which was much increased under Nebuchadnezzar. It is probable that this Nabonassar is that Baladan in the second book of Kings xx. 12. father of Merodach, who sent ambassadors to Hezekiah. See 2 Chron. xxxii.

NACRE, in ichthyology. See PINNA.

NACRE. A term applied to that beautiful white enamel which forms the greater part of the substance of the oyter-shell, particularly the pearl oyster, and which is commonly known by the name of mother-of-pearl. For its properties and chemica composition, see CONCHOLOGY.

NADIR, in astronomy, that point of the heavens which is diametrically opposite to the zenith, or point directly over our heads. The zenith and nadir are the two poles of the horizon.

NAEFELS, a town of Switzerland, in the canton of Glaris. In 1388 a celebrated victory was gained near this place, by the inhabitants of this canton over the Austrians. Only about 350 troops of Glaris, assisted by fewer than 50 Schweitzers, withstood 15,000 Austrians, and, after a terrible slaughter, compelled them to retire; in memory of which glorious transaction, a chapel was built on the spot, which was rebuilt in 1779. The inhabitants are Roman catholics. It is four miles N. of Glaris.

NAERDEN, a strong town of Holland, at the head of the canals of the province. It has experienced many calamities; particularly in 1572, when it was taken by Fernando de Toledo, son of the duke of Alva, and all the inhabitants, without distinction of age or sex, were massacred. It is seated on the Zuider-Zee, 14 miles E. of Amsterdam, and 15 N. of Utrecht. Lon. 5. 9 E. Lat. 52. 20 N.

NÆVI MATERNI. (*nævus*, Hebrew.) Metroceles. Mother's marks. These marks are upon the skin of children at birth, and are various in their nature, often depending upon the longing or aversion of the mother; hence they resemble mulberries, grapes, bacon, &c. Their seat is mostly in the rete mucosum or cellular membrane.

CN. NÆVIUS. The most remarkable of this name is an augur in the reign of Tarquin, who, in order to convince the king and the Romans of his power as an augur, cut a flint with a razor, and turned the ridicule of the populace into admiration. Tarquin rewarded his merit by erecting him a statue in the comitium, which was still in being in the age of Augustus. The razor and flint were buried near it under an altar, and it was usual among the Romans to make witnesses, in civil causes, swear near it. This event is treated as fabulous and improbable by Cicero.

NÆVIUS (Cneius), a Latin poet, who served originally in the army, but quitted that profession, and devoted himself to letters. He wrote several comedies, one of which was so displeasing to Metellus, the consul, on accounnt of its satirical strokes, that he got him banished to Utica, where he died 203 B.C. Some fragments of his are extant.

NÆVUS. See NÆVI.

NAG. *s.* (*nagge*, Dutch.) A small horse; or familiarly any horse used for riding.

NAGOLD, a town of Suabia, in the duchy of Wirtemburg, with a strong castle, situate on a river of the same name, 10 miles W. of Tubingen. Lon. 8. 37 E. Lat. 48. 30 N.

NAGORE, a town of Hindustan Proper, in the country of Agimere, 40 miles N. W. of Agimere. Lon. 74. 10 E. Lat. 27. 8 N.

NAGPOUR, a city of the Deccan of Hindustan, capital of that part of Berar which is subject to a chief of the Eastern Mahrattas. It is extensive and populous, but meanly built; and, excepting a small citadel, is open and defenceless. It is 560 miles W. by S. of Calcutta. Lon. 79. 46 E. Lat. 21. 8 N.

NAGYBANJA, a town of Hungary, which is a metal town, and one of the royal free towns. The gold and silver mine-works are of great produce, and the money coined here is distinguished by the mark NB. It is 30 miles N.E. Zatmar. Lon. 22. 54 E. Lat. 48. 10 N.

NAHE, a river of the palatinate of the Rhine, which flows by Birkenfeld, Oberstein, Kreuzenach, and Bingen, and falls into the Rhine.

NAHUM, or the Prophecy of Nahum, a canonical book of the old Testament.

Nahum, the seventh of the 12 lesser prophets, was a native of Elkoshai, a little village of Galilee. The subject of his prophecy is the destruction of Ninevah, which he describes in the most lively and pathetic manner; his style is bold and figurative, and cannot be exceeded by the most perfect masters of oratory. This prophecy was verified at the siege of that city by Astyages, in the year of the world 3378, 626 years before Christ.

NAIADES, certain inferior deities who presided over rivers, springs, wells, and fountains. They generally inhabited the country, and resorted to the woods or meadows near the stream over which they presided, whence the name (ναιειν, *to flow*). Ægle was the fairest of the Naiades, according to Virgil.

NAJAS. In botany, a genus of the class dioecia, order monandria. Male: calyx cylindrical, cloven; corol four-cleft, filamentless. Female: calyxless; corolless; pistil one; capsule ovate, one-celled. One species, common to the sea-coasts of Europe; stem with triangular spines; leaves narrow, with spinous teeth on each side; flowers axillary, solitary.

NAIL. *s.* (nœgl, Saxon; *nagel*, German.) 1. The horny substance at the ends of the fingers and toes (*Dryden*). 2. The talons of birds; the claws of beasts. 3. A spike of metal by which things are fastened together (*Watts*). 4. A stud; a boss (*Swift*). 5. A measure of length; two inches and a quarter. 6. *On the nail.* Readily; immediately; without delay (*Swift*).

To NAIL. *v. a.* 1. To fasten with nails (*Milton*). 2. To stud with nails (*Dryden*). Of these see more, as below.

NAILS. *Ungues.* In anatomy, horny laminæ, situated on the extremities of the fingers and toes.

NAILS of the bridle hand, in the manage. The different position or situation of the nails of the bridle or left hand of a horseman enables the horse with facility to change hands, and form his departure and stop; since the motion of the bridle follows such a position of the nails. To give a horse head, turn the nails downwards. To turn the horse to the right, turn them upwards, moving the hand to the right. To change to the left, turn the nails down, and bear to the left. To stop the horse, lift up or raise the hand.

NAILS (Horse.) See SHOEING.

NAILS, in building, &c. small spikes of iron, brass, &c. which being driven into wood, serve to bind several pieces together, or to fasten something upon them. The several sorts of nails are very numerous: as 1. Back and bottom nails; which are made with flat shanks to hold fast, and not open the wood. 2. Clamp-nails, for fastening the clamps in buildings, &c. 3. Clasp-nails, whose heads clasping and sticking into the wood, render the work smooth, so as to admit a plane over it. 4. Clench-nails, used by boat and barge builders, and proper for any boarded buildings that are to be taken down, because they will drive without splitting the wood, and draw without breaking; of these there are many sorts. 5. Clout-nails, used for nailing on clouts to axle-trees. 6. Deck-nails, for fastening of decks in ships, doubling of shipping, and floors laid with planks. 7. Dog-nails, for fastening hinges on doors, &c. 8. Flat-points, much used in shipping, and are proper where there is occasion to draw and hold fast, and no conveniency of clenching. 9. Jobent-nails, for nailing thin plates of iron to wood, as small hinges on cupboard-doors, &c. 10. Lead-nails, for nailing lead, leather, and canvass, to hard wood. 11. Port-nails, for nailing hinges to the ports of ships. 12. Pound-nails, which are four-square, and are much used in Essex, Norfolk, and Suffolk, and scarcely any where else, except for pailing. 13. Ribbing-nails, principally used in ship-building, for fastening the ribs of ships in their places. 14. Rose-nails, which are drawn four-square in the shank, and commonly in a round tool, as all common two-penny nails are; in some countries all the larger sort of nails are made of this shape. 15. Rother-nails, which have a full head, and are chiefly used in fastening rother-irons to ships. 16. Round-head nails, for fastening on hinges, or for any other use where a neat head is required; these are of several sorts. 17. Scupper nails, which have a broad head, and are used for fastening leather and canvass to wood. 18. Sharp-nails; these have sharp points and flat shanks, and are much used, especially in the West-Indies, for nailing soft wood. 19. Sheathing-nails, for fastening sheathing-boards to ships. 20. Square-nails, which are used for hard wood, and nailing up wall-fruit. 21. Tacks, the smallest of which serve to fasten paper to wood; the middling for wool cards, &c. and the larger for upholsterers and pumps. Nails are said to be toughened when too brittle, by heating them in a fire-shovel, and putting some tallow or grease among them.

NAILER, is used sometimes to denote one who nails, at others a nail-maker.

NAILING of cannon, more commonly called spiking. When circumstances make it necessary to abandon cannon, or when the enemy's artillery are seized, and it is not however possible to take them away, it is proper to nail them up, in order to render them useless; which is done by driving a large nail or iron spike into the vent of a piece of artillery, to render it unserviceable. There are various contrivances to force the nail out, as also sundry machines, invented for that purpose, but they have never been found of general use; so that the best method is to drill a new vent. One Gasper Vimercalus was the first who invented the nailing of cannon. He was a native of Bremen, and made use of his invention first in nailing up the artillery of Sigismund Malatesta.

NAIRN, a borough of Scotland, the county-town of Nairnshire, with a small harbour. It is seated at the mouth of the Nairn, on the Murray Frith, 15 miles N.E. of Inverness, and 120 N. of Edinburgh. Lon. 3. 6 W. Lat. 57. 38 N.

NAIRNSHIRE, a county of Scotland, 15 miles long and 10 broad; bounded on the N. by the Murray Frith, and inclosed on every other side by the counties of Inverness and Murray. It is divided into four parishes, and sends one member to parliament alternately with Cromarty. The number of inhabitants in 1801 was 8257. The S. part is mountainous, but toward the N. it is level, and the soil abundantly fertile.

NAIS, in zoology, a genus of the class vermes, order mollusca. Body creeping, long, linear, pellucid, depressed; peduncles or feet with small bristles on each side; feelerless; eyeless, or with two. Ten species; three of them common to the stagnant waters or sandy sediments of our own country; the rest for the most part found on the shores of the North Seas; generally only a few lines long, and attached to the stalks of aquatic plants. The largest, which is the quadricuspidata, is two inches and a half long, and inhabits the sandy coast of Iceland under stones, with bifid, bristly, lateral warts, and a four-cleft tail; the body composed of a hundred and four annular segments, sometimes pale red, sometimes reddish grey, with a longitudinal purplish line, of a richer colour beneath. See Nat. Hist. Pl. CXLIX.

NAIS, one of the Oceanides, mother of Chiron or Glaucus, by Magnes. 2. A nymph in an island of the Red sea, who, by her incantations, turned to fishes all those who approached her residence after she had admitted them to her embraces. She was herself changed into a fish by Apollo.

NAISSANT, in heraldry, is applied to any animal issuing out of the midst of some ordinary, and showing only his head, shoulders, fore-feet, and legs, with the tip of his tail, the rest of his body being hid in the shield, or some charge upon it; in which it differs from issuant, which denotes a living creature arising out of the bottom of any ordinary or charge.

NA'KED. *a.* (nacod, Saxon.) 1. Wanting clothes; uncovered; bare (*Milton*). 2. Unarmed; defenceless; unprovided (*Addison*). 3. Plain; evident; not hidden (*Shakspeare*). 4. Mere; bare; simple; abstracted (*Hooker*).

NAKED. *Nudus*. In botany. When applied to the stem or trunk of a vegetable, it signifies, that it is without leaves, fulcres or arms. *Qui foliis, fulcris et armis caret*. Delin. Pl. In Philos. Botan. it is said only to be destitute of leaves, but that is expressed by the term aphyllus, leafless. When applied to the leaf, it signifies, that it is destitute of all pubescence. *Setis ac pilis destitutum*. Delin. Pl. and is opposed to *tectum*, covered, in Philos. Bot. p. 233.—When applied to the flower, it implies, that the calyx is wanting; but it would be more properly called a naked flower if the corol were wanting as well as the calyx; however, it rarely happens that a flower is destitute of both. Philos. Bot. p. 76. When applied to the receptacle, it means, that it is without hairs, bristles or chaffs. When applied to a head of flowers (*capitulum*), it is opposed to leafy (*foliosum*), and implies that it has no leaves on it. When applied to a whorl (*verticillus*), the meaning is, that there is no involucre. In the same sense it is applied to the raceme, petiole, peduncle, &c.

NA'KEDLY. *ad.* 1. Without covering. 2. Simply; merely (*Holder*). 3. Discoverably; evidently (*Daniel*).

NA'KEDNESS. *s.* (from *naked.*) 1. Nudity; want of covering (*Milton*). 2. Want of provision for defence (*Genesis*). 3. Plainness; evidence; want of concealment (*Shaksp.*).

NAKOUS, an Egyptian musical instrument, made like two plates of brass, and of all sizes, from two inches to a foot in diameter; they hold them by strings fastened to their middles, and strike them together so as to beat time. They are used in the Coptic churches, and in the Mahometan processions.

NAKSIVAN, a town of Persian Armenia, capital of a province of the same name. It was formerly a large city, but ruined by Abbas I. who removed the inhabitants into the interior parts of Persia. Here are now some considerable bazars, caravanseras, public baths, and other buildings. It is 90 miles S.E. of Erivan, and 250 E. of Erzerum. Lon. 45. 30 E. Lat. 38. 40 N.

NALL. See AWL

NAMA, in botany, a genus of the class pentandria, order digynia. Calyx five-leaved; corol five-parted; capsule one-celled, two-valved. One species, a native of Jamaica; herbaceous, with axillary flowers, two or four together.

NAME. *s.* (nama, Saxon; *naem*, Dutch.) 1. The discriminative appellation of an individual (*Shakspeare*). 2. The term by which any kind or species is distinguished (*Locke*). 3. Person (*Dryden*). 4. Reputation; character (*Clarendon*). 5. Renown; fame; celebrity (*Bacon*). 6. Power delegated; imputed character (*Shakspeare*). 7. Fictitious imputation (*Dryden*). 8. Appearance; not reality; assumed character (*Shakspeare*). 9. An opprobrious appellation (*Granville*).

NAMES are distinguished into proper and appellative.

Proper names, are those which represent some individual thing or person, so as to distinguish it from all other things of the same species; as, Socrates, which represents a certain philosopher.

Appellative or *general names*, are those which signify common ideas; or which are common to several individuals of the same species; as, horse, animal, man, oak, &c.

Proper names are either called christian, as being given at baptism; or surnames: the first imposed for distinction of persons, answering to the Roman *prænomen*; the second, for the distinction of families, answering to the *nomen* of the Romans, and the *patronymicum* of the Greeks. See SURNAME.

Originally every person had but one name; as among the Jews, Adam, &c.; among the Egyptians, Busiris; among the Chaldees, Ninus; the Medes, Astyages; the Greeks, Diomedes; the Romans, Romulus; the Gauls, Diuitacus; the Germans, Ariovistus; the Britons, Cassibelan; the English, Hengist, &c. And thus of other nations, except the savages of Mount Atlas, whom Pliny and Marcellinus represent as *anonyme*, nameless.

The Jews gave the name at the circumcision, viz. eight days after the birth; the Romans, to females the same day, to males the ninth; at

which time they held a feast, called *nominalia*.

Since christianity has obtained, most nations have followed the Jews, giving the name on the eighth day after the birth; except our English ancestors, who, till of late, baptized and gave the name on the birth-day.

It is an observation deserving attention, says the Abbe Barthelemi, that the greater part of names found in Homer are marks of distinction. They are given in honour of the qualities most esteemed in the heroic ages. From the word *polemos*, which signifies war, have been formed Thepolemus and Archeptolemus, the names of two heroes mentioned in the Iliad. The former name signifies able to support, and the latter, able to direct, the labours of war. By adding to the word *mache*, or battle, certain prepositions and different parts of speech, which modify the sense in a manner always honourable, are composed the names Amphimachus, Antimachus, Promachus, Telemachus. Proceeding in the same way with the word *honorea*, strength or intrepidity, they formed the names Agapenor, he who esteems valour; Agenor, he who directs it. From *thoes*, swift, are derived, Alcathoes, Panthoes, Perithoes, &c. From *nous*, mind or intelligence, come Astynoes, Arsinoes, Autenoes, &c. From *medes*, counsel, Agamedes, Eumedes, Lycomedes, Thrasymedes, and so on.

Of late years it has obtained among us to give surnames for christian names; which some dislike, on account of the confusion it may introduce. Camden relates it as an opinion, that the practice first began in the reign of Edward VI. by such as would be god-fathers, when they were more than half fathers. Upon which some were persuaded to change their names at confirmation; which, it seems, is usual in other countries. Thus, two sons of Henry II. of France, christened Alexander and Hercules, changed them at confirmation into Henry and Francis. In monasteries the religious assume new names at their admittance, to show they are about to lead a new life, and have renounced the world, their family, and even their name; v. g. sister Mary of the Incarnation, brother Henry of the Holy Sacrament, &c. The popes also changed their names at their exaltation to the pontificate; a custom first introduced by pope Sergius, whose name till then, as Platina informs us, was Swine-snout. But Onuphrius refers it to John XII. or XIII. and at the same time adds a different reason for it from that of Platina, viz. that it was done in imitation of St. Peter and St. Paul, who were first called Simon and Saul.

Among the ancients, those deified by the heathen consecrations had new names given them; Romulus was called Quirinus; Melicertes, Portunus, or Portumnus, &c.

New names were also given in adoptions, sometimes by testament; thus L. Æmilus, adopted by Scipio, took the name of Scipio Africanus; and thus Augustus, who at first was called C. Octavius Thurinus, being adopted by the testament of Julius Cæsar into his name and family, took the name of Caius Julius Cæsar Octavianus.

To NAME. *v. a.* 1. To discriminate by a particular appellation imposed (*Shakspeare*). 2. To mention by name (*Ecclus*). 3. To specify; to nominate (*Locke*). 4. To utter; to mention (*Genesis*).

NA'MELESS. *a.* (from *name.*) 1. Not distinguished by any discriminative appellation (*Denham*). 2. One of which the name is not known or mentioned (*Atterbury*).

NA'MELY. *ad.* (from *name.*) Particularly; specially; to mention by name (*Addison*).

NA'MER. *s.* (from *name*). One who calls or knows any by name.

NA'MESAKE. *s.* One that has the same name with another.

NAMPTWICH. See NANTWICH.

NAMUR, a county, and one of the ten catholic provinces, of the Netherlands, 30 miles long and 20 broad; bounded on the N. by Brabant, and on all the other sides by the territory of Liege and a small part of Hainault. It is pretty fertile; has several forests, marble quarries, and mines of iron, lead and coal. The rivers Meuse and Sambre divide it into three parts, nearly of equal extent. By the new division of the French it forms the chief part of the department of Sambre and Meuse.

NAMUR, a city of the Netherlands, capital of the county of Namur, or the department of Sambre and Meuse, and a bishop's see. It has a castle in the middle of the town, on a craggy rock, and several forts. The inhabitants are estimated at 20,000. Fire-arms, swords, knives, and many other kinds of cutlery are made here. This city was ceded to the house of Austria by the peace of Utrecht. In 1715 it was allowed to be garrisoned by Dutch troops, as one of the barrier towns of the United Provinces; in 1746 it was taken by the French, but restored in 1748. In 1781 emperor Joseph expelled the Dutch garrison. In 1792 it was again taken by the French, who were compelled to evacuate it the following year, but they regained possession of it in 1794. It is seated between two mountains, at the confluence of the Maese and Sambre, 24 miles W.S.W. of Liege, and 32 S.E. of Brussels. Lon. 4. 45 E. Lat. 50. 29 N.

NANCI, or NANCY, a city of France, capital of the department of Meurte, and a bishop's see. It is divided by a canal into the old and new town. The first, though irregularly built, is rich and populous, and contains the palace of the ancient dukes of Lorrain; and their tombs are in a rich saloon, which adjoins the church of the late Cordeliers. The new town, whose streets are perfectly straight, was already one of the finest in Europe, before the magnificent works with which Stanislaus I. titular king of Poland, and duke of Lorrain, enriched it. The cathedral is a superb structure. Nancy is seated in a delightful plain, near the river Meurte, 92 miles N. W. of Basel, and 175 E. of Paris. Lon 6. 10 E. Lat. 48. 42 N.

NANDIDROOG, a strong fortress of Hindustan, in Mysore. Since the restoration of

the rajah, in 1799. it has been garrisoned by English troops. It is 25 miles N. by E. of Bangalore, and 64 E.S.E. of Sera.

NANDINA, in botany, a genus of the class hexandria, order monogynia. Calyx inferior, many-leaved, imbricate; corol six-petalled; berry juiceless, two-seeded. One species; a branched shrub of Japan, with more than decompound leaves, and terminal panicle.

NANFIO, an island of the Archipelago, a little to the E. of that of Santorini. It is 16 miles in circumference, but has no harbour, nor springs sufficient to water the fields. The inhabitants are all Greeks, and their trade is in onions, wax, and honey. The ruins of the temple of Apollo are yet to be seen, and consist chiefly of marble columns. Lon. 26. 10 E. Lat. 36. 15 N.

NANI (John Baptist), a Venetian, proctor of St. Mark. He was admitted into the college of senators, 1641, and went as ambassador to France, and obtained from the French court succours in men and money to continue the war against the Turks in Candia. He was afterwards ambassador to the emperor, and was appointed, for his services, proctor of St. Mark, and captain general of the marine. He died in 1678. He was the author of an history of Venice, undertaken at the request of the senate, 2 vols. 4to.

NANKEEN, or Nan-king, is a well-known cotton stuff, which derives its name from the ancient capital of China. It is, however, according to Van Braam, manufactured at a great distance from that city, in the district of Fong-kiang-fou, situated in the south-east of the province of Kiang-nam upon the sea-shore. The colour of nankeen is natural, the down of which it is made being of the same yellow tinge with the cloth. The colour, as well as superior quality of this cotton, seems to be derived from the soil; for it is said that the seeds of the nankeen cotton degenerate in both particulars when transplanted to another province, however little different in its climate. The common opinion, that the colour of the stuff is given by a dye, occasioned an order from Europe, some years ago, to dye the pieces of nankeen of a deeper colour than they had at that period; and the reason of their being then paler than formerly is as follows:

Shortly after the Americans began to trade with China, the demand increased to nearly double the quantity it was possible to furnish. To supply this deficiency, the manufacturers mixed common white cotton with the brown; this gave it a pale cast, which was immediately remarked; and for this lighter kind no purchaser could be found till the other was exhausted. As the consumption is grown less during the last three years, the mixture of cotton is no longer necessary, and nankeen is become what it was before. By keeping them two or three years, it even appears that they have the property of growing darker. This kind of stuff must be acknowledged to be the strongest yet known. Many persons have found that clothes made of it will last three or four years, although for ever in the wash. This it is that makes them the favourite wear for breeches and waistcoats both in Europe and America. The white nankeen is of the same quality, and is made of white cotton as good as the brown, and which also grows in Kiang-nam.

NAN-KING, or Kiang-nin, a city of China, capital of the province of Kiang-nan, said to have been formerly one of the most beautiful and flourishing cities in the world. When the Chinese speak of its extent, they say, if two horsemen should go out in the morning by the same gate, and ride round it on full speed, taking different directions, they would not meet before night. This account is evidently exaggerated; but it is certain, that Nan-king surpasses in extent all the other cities of China. We are assured, that its walls are five leagues and a half in circumference. This city is situated at the distance of a league from the river Yang-tse-kiang; it is of an irregular figure; the mountains which are within its circumference having prevented its being built on a regular plan. It was formerly the imperial city; for this reason it was called Nan-king, which signifies, the southern court; but since the six grand tribunals have been transferred from hence to Pe-king, it is called Kiang-ning in all the public acts. Nan-king has lost much of its ancient splendour: it had formerly a magnificent palace, no vestige of which is now to be seen; an observatory, at present neglected; temples, tombs of the emperors, and other superb monuments, of which nothing remains but the remembrance. A third of the city is deserted, but the rest is well inhabited. Some quarters of it are extremely populous and full of business. The streets are not so broad as those of Pe-king. they are, however, very beautiful, well paved, and bordered with rich shops. Here are no public edifices corresponding to the reputation of so celebrated a city, excepting its gates, which are very beautiful, and some temples, among which is the famous porcelain tower. It is two hundred feet high, and divided into nine stories, by plain boards within and without, by cornices and small projections covered with green-varnished tiles. There is an ascent of forty steps to the first story; between each of the others there are twenty-one: 500 miles S.S.E. Pe-king. Lon. 118. 47 E. Lat. 32. 5 N.

NANTES, an ancient and flourishing commercial town of France, in the department of Lower Loire, with a bishop's see, and a university. It was formerly the residence of the dukes of Bretagne, who built a strong castle on the side of the river, which still exists. The cathedral contains the tombs of the ancient dukes. The bridges over the Loire, in which are some islands, are almost a league in length. The suburbs exceed the city in extent. The inhabitants are computed at 60,000. Since the peace in 1783, Nantes has had a considerable share in the commerce with the United

States. A great quantity of salt is made in the territory of Nantes, both at the bay of Bourgneuf, and in the salt marshes of Guerande and Croisic. Large vessels can come no higher than Port Launai, which is 12 miles from Nantes. It was here that Henry IV. promulgated the famous edict, in 1598, in favour of the protestants, which was revoked in 1685 by Lewis XIV. Nantes is 58 miles S. by E. of Rennes, and 217 S.W. of Paris. Lon. 1. 45 W. Lat. 47. 13 N.

NANTUCKET, an island in the state of Massachusets, of which it is a county. It lies to the S. of Cape Cod, and had once the most considerable whale fishery on the coast; but it was almost ruined by the civil war. As the island is low, sandy, and barren, the inhabitants depend almost entirely on the watery element for subsistence. It has but one town, called Sherburne, which is 83 miles S. of Boston. Lon. 70. 30 W. Lat. 41. 0 N.

NANTUEIL (Robert), a celebrated miniature painter and engraver, was born at Rheims in 1630. He drew the portrait of Louis XIV. in crayons with so much elegance, that the king made him designer and engraver to his cabinet, with a considerable salary. He died at Paris in 1678. His engravings of portraits are highly valued.

NANTWICH, or NAMPTWICH, a town of England, in the county of Chester, situated on the river Weaver, which divides it in two parts, and by the Chester canal, which is finished here with a broad bason, forming a kind of harbour. The inhabitants carry on a considerable trade in salt and cheese; for both of which this town and environs are celebrated. A cotton manufacture has lately been established; that of shoes has been of some continuance. The town is governed by a constable, &c. who are guardians of the salt springs. Here is a large weekly market for corn and cattle, held on Saturday: nineteen miles and a half S.E. Chester, and 162 N.W. London.

NAP. *s.* (hnœppan, Saxon, to sleep.) 1. Slumber; a short sleep (*Sidney*). 2. (hnoppa, Saxon.) Down; villous substance (*Spenser*).

To NAP. *v. a.* (hnœppan, Saxon.) To sleep; to be drowsy or secure (*Hudibras*).

NAPÆA, in botany, a genus of the class dioecia, order monadelphia. Calyx five-cleft; petals five. Male: stamens numerous; styles numerous, barren. Female; stamens numerous, barren; styles numerous, longer than the stamens; capsule depressed, ten-celled; seeds solitary. Two species, natives of Virginia; and both hardy, herbaceous, flowering perennials, frequently found in the borders of our pleasure-gardens.

N[illegible]a, certain divinities among the ancients, who presided over the hills and woods of the country. Some suppose that they were titulary deities of the fountains and the Naiades of the sea. Their name is derived from ναπη, a grove.

NAPAUL, a province of Hindustan Proper, bounded on the S. by Bahar, on the W. by Oude and Rohilcund, on the N.W. by Sirinagur, and on the N.E. and E. by the ridge of mountains called Himmaleh, by which it is separated from Thibet. Catmandu is the capital.

NAPELLUS. (*napellus*, dim. of *napus*, a kind of turnip, because it has a bulbous root like a turnip.) Wolf's bane. See ACONITUM.

NAPE. *s.* The joint of the neck behind (*Shakspeare*).

NAPERY. *s.* (*naperia*, Italian.) Table linen.

NAPHÆ FLORES. A term sometimes applied to the flowers of the citrus aurantium. See AURANTIUM.

NAPHTHA, in mineralogy, a species of BITUMEN; which see.

NAPIER (John), baron of Merchiston, inventor of the logarithms, was the eldest son of sir Archibald Napier of Merchiston, and born in the year 1550. Having given early discoveries of great natural parts, his father was careful to have them cultivated by a liberal education. After going through the ordinary courses of philosophy at the university of St. Andrew's, he made the tour of France, Italy, and Germany. Upon his return to his native country his literature and other fine accomplishments soon rendered him conspicuous, and might have raised him to the highest offices in the state; but declining all civil employments, and the bustle of the court, he retired from the world to pursue literary researches, in which he made an uncommon progress, so as to have favoured mankind with sundry useful discoveries. He applied himself chiefly to the study of mathematics; but at the same time did not neglect that of the Holy Scriptures. In both these he has discovered the most extensive knowledge and profound penetration. His essay upon the book of the Apocalypse indicates the most acute investigation, and an uncommon strength of judgment; though time has discovered, that his calculations concerning particular events had proceeded upon fallacious data. But what has chifly rendered his name famous, was his great and fortunate discovery of logarithms in trigonometry, by which the ease and expedition in calculation have so wonderfully assisted the science of astronomy and the arts of practical geometry and navigation. Napier, having a great attachment to astronomy, and spherical trigonometry, had occasion to make many numeral calculations of such triangles, with sines, tangents, &c.; and these being expressed in large numbers, they hence occasioned a great deal of labour and trouble: to spare themselves part of this labour, Napier, and other authors about his time, set themselves to find out certain short modes of calculation, as is evident from many of their writings. To this necessity, and these endeavours it is, that we owe several ingenious contrivances; particularly the computation by Napier's rods, and several other curious and short methods that are given in his Rabdologia; and at length, after trials

of many other means, the most complete one of logarithms, in the actual construction of a large table of numbers in arithmetical progression, adapted to a set of as many others in geometrical progression. The property of such numbers had been long known, viz. that the addition of the former answered to the multiplication of the latter, &c.; but it wanted the necessity of such very troublesome calculations as those above mentioned, joined to an ardent disposition, to make such a use of that property. Perhaps also this disposition was urged into action by certain attempts of this kind, which it seems were made elsewhere. Whatever might be the inducement however, Napier published his invention in 1614, under the title of Logarithmorum Canonis Descriptio, &c., containing the construction and canon of his logarithms, which are those of the kind that is called hyperbolic. This work coming presently to the hands of Mr. Briggs, then professor of geometry at Gresham College in London, he immediately gave it the greatest encouragement, teaching the nature of the logarithms in his public lectures, and at the same time recommending a change in the scale of them, by which they might be advantageously altered to the kind which he afterwards computed himself, which are thence called Briggs's Logarithms, and are those now in common use. Mr. Briggs also presently wrote to lord Napier upon this proposed change, and made journeys to Scotland the two following years to visit Napier, and consult him about that alteration, before he set about making it. Briggs, in a letter to archbishop Usher, March 10, 1615, writes thus: "Napier lord of Markinston hath set my head and hands at work with his new and admirable logarithms. I hope to see him this summer, if it please God; for I never saw a book which pleased me better, and made me more wonder." Briggs accordingly made him the visit, and staid a month with him.

The following passage, from the life of Lilly the astrologer, contains a curious account of the meeting of those two illustrious men. "I will acquaint you (says Lilly) with one memorable story related unto me by John Marr, an excellent mathematician and geometrician, whom I conceive you remember. He was servant to king James and Charles the First. At first when the lord Napier, or Marchiston, made public his logarithms, Mr. Briggs, then reader of the astronomy lectures at Gresham College in London, was so surprised with admiration of them, that he could have no quietness in himself until he had seen that noble person the lord Marchiston, whose only invention they were: he acquaints John Marr herewith, who went into Scotland before Mr. Briggs, purposely to be there when these two so learned persons should meet. Mr. Briggs appoints a day when to meet at Edinburgh: but failing thereof, the lord Napier was doubtful he would not come. It happened one day as John Marr and the lord Napier were speaking of Mr. Briggs; 'Ah, John, (said Marchiston), Mr. Briggs will not now come.' At the very instant one knocks at the gate; John Marr hasted down, and it proved Mr. Briggs to his great contentment. He brings Mr. Briggs up into my lord's chamber, where almost one quarter of an hour was spent, each beholding other almost with admiration before one word was spoke. At last Mr. Briggs began: 'My lord, I have undertaken this long journey purposely to see your person, and to know by what engine of wit or ingenuity you came first to think of this most excellent help into astronomy, viz. the logarithms; but, my lord, being by you found out, I wonder nobody else found it out before, when now known it is so easy.' He was nobly entertained by the lord Napier; and every summer after that, during the lord's being alive, this venerable man, Mr. Briggs, went purposely into Scotland to visit him."

Napier made also considerable improvements in spherical trigonometry, &c. particularly by his Catholic or Universal Rule, being a general theorem by which he resolves all the cases of right-angled spherical triangles in a manner very simple and easy to be remembered, namely, by what he calls the Five Circular Parts. His construction of logarithms too, beside the labour of them, manifests the greatest ingenuity. Kepler dedicated his Ephemerides to Napier, which were published in the year 1617; and it appears from many passages in his letter about this time, that he accounted Napier to be the greatest man of his age in the particular department to which he applied his abilities.

The last literary exertion of this eminent person was the publication of his Rabdology and Promptuary, in the year 1617; soon after which he died at Marchiston, the 3d of April in the same year, in the 68th year of his age.—The list of his works is as follows:

1. A Plain Discovery of the Revelation of St. John; 1593.
2. Logarithmorum Canonis Descriptio; 1614.
3. Mirifici Logarithmorum Canonis Constructio; et eorum ad Naturales ipsorum numeros habitudines; una cum appendice, de alia eaque præstantiore Logarithmorum specie condenda. Quibus accessere propositiones ad triangula sphærica faciliore calculo resolvenda. Una cum Annotationibus aliquot doctissimi D. Henrici Briggii in eas, et memoratum appendicem. Published by the author's son in 1619.
4. Rabdologia, seu Numerationis per Virgulas, libri duo; 1617. This contains the description and use of the bones or rods; with several other short and ingenious modes of calculation.
5. His Letter to Anthony Bacon (the original of which is in the archbishop's library at Lambeth), entitled, Secret Inventions, Profitable and Necessary in these Days for the Defence of this Island, and withstanding Strangers Enemies to God's Truth and Religion; dated June 2, 1596.

NAPIER'S BONES, OF RODS, an instrument contrived by lord Napier, for the more easy performing of the arithmetical operations of multiplication, division, &c. These rods are five in number, made of bone, ivory, horn, wood, or pasteboard, &c. Their faces are divided into nine little squares; each of which is parted into two triangles by diagonals. In these little squares are written the numbers of the multiplication-table; in such manner as that the units, or right-hand figures, are found in the right-hand triangle; and the tens, or the left-hand figures, in the left-hand triangle. The method of using them need not be here explained.

NA'PKIN, *s.* (from *nap.*) 1. A cloth used at table to wipe the hands. 2. A handkerchief: obsolete (*Shakspeare*).

NAPLES, once a celebrated kingdom of Europe, comprehending the S. part of Italy, bounded on the N.W. by the ecclesiastical state, N.E. by the gulf of Venice, and every where else by the Mediterranean. It is 300 miles in length, by 100 in breadth, and divided into twelve provinces; namely, Terra di Lavoro (the ancient Campania Felix), Principato Citeriore and Ulteriore, Molise, Basilicata, Calabria Citeriore and Ulteriore, Abruzzo Citeriore and Ulteriore, Capitanata, Terra di Bari, and Terra d'Otranto; the last three forming the ancient Apulia, now called Puglia, on the E. side of the kingdom. After many revolutions, the Normans became masters of this country in the eleventh century; and the sovereigns were called counts, then dukes, and afterwards kings of Puglia. In 1282, Peter III., king of Arragon, caused all the Normans in the island of Sicily to be massacred; and this massacre was called the Sicilian Vespers. After this Puglia was joined to Sicily; and hence the sovereigns took the title of king of the Two Sicilies. It has also been called the kingdom of Naples, from its capital. France and Spain contended for the sovereignty in the sequel, and bloody wars and revolutions were the consequence. The French being defeated by the Spaniards in 1504, Lewis XII. formally renounced all pretensions to the crown, and the country was governed by Spanish viceroys. In 1647 happened the dreadful insurrection of Massaniello in the city of Naples, by which the Spaniards were nearly expelled. The people, however, returning to their allegiance, on the assassination of Massaniello, the Spaniards continued in peaceable possession of the kingdom till 1707, when it was conquered by prince Eugene, and ceded to the emperor by the treaty of Rastadt in 1714. It was recovered, however, by the Spaniards in 1734; and Ferdinand IV., a prince of Spain, is now king of Naples and Sicily. The title of the king's eldest son is prince of Calabria. The climate is extremely hot, especially in July, August, and September; and is said to be one of the most inconstant and unfavourable to valetudinarians. In some seasons it rains every day for six or seven weeks together; but the most disagreeable part of the climate is the siroco, or S.E. wind, which is very common in May, and extremely relaxing. In winter there is seldom any ice or snow, except on the mountains. The country abounds with grain, the finest fruits and vegetables, rice, flax, oil, wine, saffron, and manna; and affords alum, vitriol, sulphur, rock crystal, marble, minerals, and fine wool and silk. Beside the manufactures noticed in the account of the city of Naples, waistcoats, caps, stockings, and gloves are also made of the hair or filaments of a shell-fish, which are warmer than those of wool, and of a beautiful glossy green. The principal mountains are the Apennines, which traverse this country from N. to S., branching out to the two extremities; and the celebrated volcano, mount Vesuvius. The rivers are numerous, but inconsiderable; the chief are the Garigliano and Volturno. One of the greatest inconveniences to which this kingdom is exposed is earthquakes. The established religion is the Roman catholic, and the clergy and convents possess two-thirds of the whole kingdom; but protestants and Jews are allowed to settle here.

Such was the former state of Naples. But being seized by the emperor of France, he affirmed "the Neapolitan dynasty has ceased to reign: its existence is incompatible with the repose of Europe, and the honour of our crown." By virtue of a decree which passed in March 1808, the emperor Napoleon conferred the kingdom of Naples on his highness prince Joseph and his legitimate heirs male, reserving to that prince the rights assured to him by the constitutions of the empire, by providing always that the crown of France and that of Naples shall never be united upon the same head.

NAPLES, a city of Italy, capital of a kingdom of the same name, and an archbishop's see, with a university. It is seated on the bay of Naples, and built in the form of a vast amphitheatre, sloping from the hills to the sea. Although the style of architecture is inferior to what prevails at Rome, and it cannot vie with that city in the number of palaces, or in the magnificence of the churches, the private houses, in general, are better built, and the streets are broader and better paved. The houses, in general, are five or six stories high, and flat at the top; on which are placed numbers of flower vases, or fruit trees, in boxes of earth. The fortress of St. Elmo is built on a mountain of the same name, and has the entire command of the town. Lower down on the same mountain, in a delightful situation, is the convent of Carthusians, on which much expence has been lavished, to render the building and the gardens equal to the situation. Naples is well situate for commerce, and has all the necessaries and luxuries of life in great profusion; but trade is in a languishing condition. The chief articles manufactured here are silk stockings, soap, snuff-boxes of tortoise-shell and lava, and tables and ornamental furniture of marble. They are thought to em-

The narcissus poeticus yields many varieties, purple-cupped flowers, yellow-cupped flowers, double-flowers, the petals in all of them being entire and white. It derives its specific name from its being the real narcissus of the Greek and Roman poets, and deservedly extolled by them for its great beauty and fragrance.

The tazetta, or polyanthus daffodil, yields also a great multitude of varieties, amounting in the Dutch catalogues to upwards of a hundred. They are all beautiful flowers, and afford a charming appearance, whether the borders of flower-gardens, or in glasses of water, or ornamental pots as a decoration to drawing rooms.

The jonquil exhibits, in like manner, a very considerable variety, and in every variety, on account of its delicacy of shape, softness of colour, and sweetness of scent, is among the most agreeable of the flowers presented to us in the vernal months.

Most of these may be propagated either by offsets or by seeds. If offsets, such as have been with the parent root three years in the ground should be chosen, taken off in August, and planted at ten inches distance. The method by seeds is in all respects preferable, and is in general such as must be used for all the narcissus kinds, with only a few peculiarities. The seeds should be obtained from the countries in which this plant grows naturally, and such seeds should be carefully collected from good flowers. They must be sown the first week in September, in boxes of a light, rich compost, and set where they can have free air, and the morning sun. In winter the boxes should be removed into a southern aspect, and towards April be taken back into their first place again. In spring the young plants will appear, and they must be kept clear of weeds, and sometimes gently watered. Towards autumn they will fade, when a quarter of an inch thick of the same compost should be sifted over them. The third year they must be separated from the earth by sifting, and planted out in a place sheltered from the winds, and not open to the full sun. The beginning of August is the best time for planting them; the beds must after this be kept clear from weeds, and five weeks after they must have a fresh covering of an inch deep of the same compost. In this bed they will flower, and they should stand at a foot distance, and not be taken up till the fourth year.

NARCISSUS (Autumnal). See AMARYLLIS.

NARCOSIS. (*narcosis*, f. ναρκωσις; from ναρκοω, to stupefy.) Stupefaction, stupor, numbness.

NARCOTIC. *a.* (ναρκοω, *narcotique*, Fr.) Producing torpor, or stupefaction.

NARCOTIC PRINCIPLE in PLANTS. It has long been known that the milky juices which exude from certain plants, as the poppy, lettuce, &c. and the infusions of others, as the leaves of the digitalis purpurea, have the property of exciting sleep, or if taken in large enough doses, of inducing a state resembling apoplexy, and terminating in death. How far these plants owe these properties to certain common principles which they possess is not known; though it is exceedingly probable that they do. But as a peculiar substance has been detected in opium, the most noted of the narcotic preparations, which possesses narcotic properties in perfection, we are warranted, till further experiments elucidate the subject, to consider it as the narcotic principle, or at least as one species of the substances belonging to this genus.

Opium is obtained from the papaver album, or white poppy, a plant which is cultivated in great abundance in India and the East. The poppies are planted in a fertile soil and well watered. After the flowering is over, and the seed capsules have attained nearly their full size, a longitudinal incision is made in them about sun-set for three or four evenings in succession. From these incisions there flows a milky juice, which soon concretes, and is scraped off the plant and wrought into cakes. In this state it is brought to Europe.

Opium thus prepared is a tough brown substance, has a peculiar smell, and a nauseous bitter acrid taste. It becomes softer when held in the warm hand, sand burns very readily and strongly. It is a very compound substance, containing sulphate of lime, sulphate of potash, an oil, a resinous body, an extractive matter, gluten, mucilage, &c. besides the peculiar narcotic principle, to which probably it owes its virtues as a narcotic.

Almost all the medical chemists have published analyses of opium. To their labours indeed we are indebted for every thing concerning it at present known. Newmann, Hoffman, Trulles, Baumé, have distinguished themselves most; and more lately remarks have been published on it by Josse, Buchole, Proust, and Dèrosne. The dissertation of the last is peculiarly valuable. He first pointed out the nature and properties of the narcotic principles of opium. It had indeed been noticed by most of the elder chemists, though they had formed erroneous opinions respecting its nature. When water is digested upon opium a considerable portion of it is dissolved, the water soaking up several of its constituents. When this solution is evaporated to the consistence of syrup, a gritty precipitate begins to appear, which is considerably increased by diluting the liquid with water. It consists chiefly of three ingredients; namely, resin, oxigenized extractive, and the peculiar narcotic principle, which is crystallized. When alcohol is digested on this precipitate, the resin and narcotic substance are taken up, while the oxygenized extractive remains behind. The narcotic principle falls down in crystals as the solution cools, still however coloured with resin.

But it may be obtained tolerably pure by repeated solutions and crystallizations. Water is incapable of dissolving the whole of opium. What remains behind still contains a considerable portion of narcotic principle. When

alcohol is digested on this residuum it acquires a deep red colour; and deposites on cooling crystals of narcotic principles, coloured by resin, which may be purified by repeated crystallizations. The narcotic principle obtained by either of these methods possesses the following properties.

1. Its colour is white. It crystallizes rectangular prisms with rhomboidal bases. It has neither taste nor smell.

2. It is insoluble in cold water, soluble in about 400 parts of boiling water, but precipitates again as the solution cools. The solution in boiling water does not affect vegetable blues.

3. It is soluble in 24 parts of boiling alcohol and 100 parts of cold alcohol. When water is mixed with the solution, the narcotic principle precipitates in the state of a white powder.

4. Hot æther dissolves it, but lets it fall on cooling.

5. When heated in a spoon it melts like wax. When distilled it froths and emits white vapours, which condense into a yellow oil. Some water and carbonate of ammonia pass into the receiver; and at last carbonic acid gas, ammonia, and carburetted hydrogen gas, are disengaged. There remains a bulky coal, which yields traces of pot-ash. The oil obtained by this process is viscid, and has a peculiar aromatic smell, and an acrid taste.

6. It is very soluble in all acids. Alkalies throw it down from these solutions in the state of a white powder.

7. Alkalies render it rather more soluble in water. When they are saturated with acids, the narcotic principle falls down in the state of a white powder, which is redissolved by adding an excess of acid.

8. Volatile oils while hot dissolve it, but on cooling they let it fall in an oleaginous state at first, but gradually crystallizes.

9. When treated with nitric acid it becomes red and dissolves; much oxalic acid is formed, and a bitter substance remains behind.

10. When potash is added to the aqueous solution of opium, the narcotic principle is thrown down; but it retains a portion of the potash.

11. Its solubility in water and alcohol, when immediately extracted from opium, seems to be owing to the presence of resin and extractive matter, both of which render it soluble.

12. It possesses the properties of opium in perfection. Dèrosne tried it upon several dogs, and found it more powerful than opium. Its bad effects were counteracted by causing the animals to swallow vinegar. This substance is known to be of equal service in counteracting the effects of opium. Dèrosne supposes that the efficacy of vinegar may be owing to the readiness with which it dissolves the narcotic principle. Many other substances besides opium possess narcotic virtues, but hitherto they have not been examined by chemists with much attention. The most remarkable are the following:

1. The lactuca virosa, and the sativa, or garden lettuce, and indeed all the lactucas, yield a milky juice, which, when inspissated, has very much the appearance of opium, and possesses the same properties. Indeed Dr. Coxe of Philadelphia affirms, that as good opium may be obtained from the garden lettuce as from the poppy. The milky juice is obtained by incisions at the time when the lettuce is running to seed. The resemblance between the inspissated juice of the lactuca virosa and opium is striking.

2. The leaves of the atropa belladonna, deadly nightshade, and indeed the whole plant, are remarkably narcotic; and when taken in too great doses produce blindness, convulsions, coma, and death.

3. The leaves of the digitalis purpurea, or fox-glove, are still more powerful, if possible. They lower the pulse in a remarkable degree, and like several other very poisonous narcotics, promote the discharge of urine.

4. The hyoscyamus niger, or hen-bane.

5. Conium maculatum, or hemlock.

6. Datura stramonium.

7. Ledum palustre.

To these may perhaps be added the prunus laurocerasus, and the leaves of nicotiana tabacum, or tobacco. The list indeed might be easily increased: almost all the plants belonging to the natural order of the lurida possessing narcotic properties: but as we are completely ignorant of the chemical properties of these plants, it is unnecessary to be more particular.

Narcotics. (*narcotica, medicamenta;* from *ναρκοω* to stupefy.) See Anodynes.

NARD (Celtic.) See Nardus celtica.

Nard (Indian). See Nardus indica.

NARDUS. Matgrass. In botany, a genus of the class triandria, order monogynia. Calyxless; corol a two-valved glume. Three species, as follows:

1. N. striata. Spike slender, erect, pointing one way. Common to our heaths.

2. N. aristata. Glumes of the calyx awned. Florets slightly peduncled in pairs. Indigenous to the south of Europe.

3. N. ciliaris. Spike incurved, ciliate on the edge. Leaves grassy, flat; florets on the outer valve, ovate-oblong, awnless, with a short bristle on each side.

It is customary under this article to descant on the value attached to the nardus, as a perfume, by the Greeks, and Romans, and indeed by all the oriental countries from which they undoubtedly derived it. But we shall forbear all such discussions till we learn to a certainty what is the plant referred to under this name by the Greek and Roman poets: we are confident it does not belong to the genus before us; and sir William Jones has very plausibly attempted to prove that it was a species of valerian.

NARDUS. (*nardus*, νάρδος; from *nard*, Syr.) Spikenard.

NARDUS CELTICA. Spica celtica. Celtic nard. Valeriana celtica of Linnéus. The root of this plant, a native of the Alps, has been recommended as a stomachic, carminative, and diuretic. At present it is only used in this country in the theriaca and mithridate, though its sensible qualities promise some considerable medicinal powers. It has a moderately strong smell, and a warm, bitterish, sub-acrid taste.

NARDUS INDICA. Spica nardi. Spica indica. Indian nard, or spike-nard. The root of this plant, andropogon nardus of Linnéus, is an ingredient in the mithridate and theriaca; it is moderately warm and pungent, accompanied with a flavour not disagreeable. It is said to be used amongst the orientals as a spice.

NARDUS RUSTICA. An old name of the asarabacca. See ASARUM.

NAREA, the most southerly province of the empire of Abyssinia; a kingdom still governed by its own princes, who have the title of Beneros. Its territory was formerly more extensive than at present, the Galla having almost quite surrounded it, especially on the south-east and north. The country to the west is the most unknown part of Africa; the kingdom itself stands like a fortified place in the middle of a plain, being an high and mountainous country. A great many rivers, rising in the fourth and fifth degrees of north latitude, spread themselves over the level part of the country, and fill it with marshes all the way from south by east to north, or north-west.—These marshes are bounded by mountains, of which those nearest the marshes are overgrown with coffee-trees, the largest, if not the only ones, which grow in this country. The kingdom of Narea Proper is interspersed with small, unwholesome, but very fertile valleys.

NARES. (*naris*, a nostril.) In anatomy, the nostrils. The cavity of the nostrils is of a pyramidal figure, and is situated under the anterior part of the cranium in the middle of the face. It is composed of fourteen bones, viz. the frontal, two maxillary, two nasal, two lachrymal, two inferior spongy, the sphænoid, the vomer, the ethmoid, and two palatine bones, which form several eminences and cavities. The eminences are the septum narium, the cavernous substance of the ethmoid bone, called the superior conchæ, and the inferior spongy bones. The cavities are three pair of pituitary sinuses, namely, the frontal, sphænoid and maxillary; the anterior and posterior foramina of the nostrils; the ductus nasalis, the sphæno palatine foramina, and anterior palatine foramina. All these parts are covered with periosteum, and a pituitary membrane which secretes the mucus of the nostrils. The arteries of this cavity are branches of the internal maxillary. The veins empty themselves into the internal jugulars. The nerves are branches of the olfactory, ophthalmic, and superior maxillary. The use of the nostrils is for smelling, respiration, and speech.

NARES (James), doctor of music, and brother to judge Nares, was born at Stanwell, 1715. He was one of the choristers of the royal chapel, and in 1734 became organist at York. In 1755 he was organist and composer to the king, in the room of Dr. Green, and the next year he took his musical degree at Cambridge, and in 1757 was made master of the chorists, which he resigned in 1780 to his pupil Dr. Ayrton. He died 1783. His works are much admired, especially the royal pastoral, an ode.

NARIS COMPRESSOR, in myology. See COMPRESSOR NARIS.

NA'RRABLE. *a.* (from *narro*, Lat.) Capable to be told or related.

To NA'RRATE. *v. a.* (*narro*, Latin.) To relate; to tell.

NARRA'TION. *s.* (*narratio*, Latin.) Account; relation; history (*Abbot*).

NA'RRATIVE. *a.* (*narratif-ve*, French; from *narro*, Latin.) 1. Relating; giving an account (*Ayliffe*). 2. Storytelling; apt to relate things past (*Pope*).

NA'RRATIVE. *s.* A relation; an account; a story (*Tatler*).

NA'RRATIVELY. *ad.* (from *narrative.*) By way of relation (*Ayliffe*).

NARRA'TOR *s.* (*narrateur*, French.) A teller; a relater (*Watts*).

NA'RROW. *a.* (neapu, Saxon). 1. Not broad or wide (*Shakspeare*). 2. Small; of no great extent (*Brown*). 3. Covetous; avaritious (*Sidney*). 4. Contracted; ungenerous (*Sprat*). 5. Near; within a small distance (*Dryd.*). 6. Close; vigilant; attentive (*Milton*).

NARROW-CHESTED. In the menage, a horse is so called, whose breast is so narrow (when standing before him) that the fore-legs gradually extend wider in proportion as the eye accompanies them nearer the ground; so that, in a front view, they bear the form of two legs of a common country washing-stool, where the legs are inserted in the narrow part of the wood at the top, and are four or five inches more in width at the bottom. Horses of this description are invariably weak before; and when put into hard work, or severe exertion, are the very sort of which so many upon the roads are seen in a chest-foundered state. See CHEST FOUNDERED.

To NA'RROW. *v. a.* 1. To diminish with respect to breadth (*Temp.*). 2. To contract; to impair dignity (*Locke*). 3. To contract in sentiment (*Pope*). 4. To confine; to limit (*Watts*). 5. (In farriery.) A horse is said to *narrow* when he does not take ground enough.

NA'RROWLY. *ad.* (from *narrow.*) 1. With little breadth or wideness. 2. Contractedly; without extent (*Swift*). 3. Closely; vigilantly (*Shaksp.*). 4. Nearly; within a little (*Swift*). 5. Avaritiously; sparingly.

NA'RROWNESS. *s.* (from *narrow.*) 1. Want of breadth or wideness (*Addison*). 2. Want of extent, or comprehension (*Locke*). 3. Confined state; contractedness (*Denham*). 4. Meanness; poverty (*South*). 5. Want of capacity (*Burnet*).

NARTHECIUM. Lancashire asphodel. In botany, a genus of the class hexandria,

order monogynia. Corol six-petalled, spreading, permanent; filaments filiform, bearded; capule superior, prismatic; seeds appendaged each side; calyxless. One species, indigenous to the bogs of our own country.

NARVA, a strong town of the Russian empire, in Livonia, with a castle and a harbour. It was taken by the Muscovites from the Danes in 1558, by the Swedes in 1581, and they defeated the Muscovites near it in 1700; but it was retaken by the Russians in 1704 by storm, and the inhabitants sent to Astracan. It is seated on the river Narva, 95 miles S.W. of Wiburg, and 172 N.E. of Riga. Lon. 29. 0 E. Lat. 59. 8 N.

NARVAL, in mastiology. See Cete.

NAS. (from *ne has*, or *has not.*) *Spenser.*

NA'SAL. *a.* (*nasus*, Latin.) Belonging to the nose (*Sharp*).

NASALIS, in myology. See Compressor naris.

NASEBY, a village in Northamptonshire, famous for the decisive victory gained by the army of the parliament over that of Charles I., in 1645. It is 12 miles N. of Northampton.

NASHVILLE, a town of the state of Tennassee, capital of the district of Mero, seated on Cumberland river, 160 miles E. of Knoxville. Lon. 87. 20 W. Lat. 36. 2 N.

NASH (Richard), an extraordinary character, born in Glamorganshire, 1764. From Carmarthen school he went to Jesus college, Oxford, where he became known more for his love of pleasure than for his application. He entered the army, and obtained a pair of colours; but soon relinquished this for a town life, and the law at the Temple. Admired as a jovial companion, he became the arbiter elegantiarum of the fashionable world, and when the Middle Temple, according to custom, exhibited an entertainment for king William, Nash managed the ceremony so well, that the monarch offered him the honour of knighthood, which he declined. In 1704 Nash went to Bath, and being elected master of ceremonies, he soon made that city the resort of the gay, the fashionable, and the opulent. The greatest regularity was made to prevail in the public rooms, and Bath, lately known to few, became the centre of attraction for persons in the higher rank of life. Nash supported his expences chiefly from the gaming table; but with this vicious propensity, he was humane, generous, and charitable, and though persecuted by creditors, he has often bestowed on the cravings of indigence what was due from him to patient industry. Flattered with the appellation of the king of Bath, and called beau nash, he continued his career of genteel, or, as it should rather be termed, profligate dissipation, though his income was precarious, and his resources depended on chance. In the decline of life he became very poor, and the presents, formerly received from the partiality of the great, were all disposed of to support his necessities. His last moments brought with them, as might be expected, unpleasing reflections, and he expired in great agitation of mind, 1761, aged 87. As he had contributed to the celebrity of Bath, and promoted the building of an hospital, the people of the city shewed due respect to his remains there. A striking letter written to this celebrated fop, in order to convince him that he had a soul which must appear undressed in the presence of the Great Judge, may be seen in Dodd's Reflections on Death, page 111.

NASI DEPRESSOR. See Depressor labii superioris alæque nasi.

Nasi ossa. (*nasus.*) The two small bones of the nose that are so termed form the bridge of the nose. In figure they are quadrangular and oblong.

NA'SICORNOUS. *a.* (*nasus* and *cornu.*) Having the horn on the nose (*Brown*).

NASSAU, a county of Germany, in the circle of Upper Rhine; bounded on the N. by Westphalia, on the E. by the county of Solmes, on the S. by the territory of Mentz, and on the W. by the electorate of Treves. It is very fertile, and contains mines of iron, copper, and lead.

Nassau, a town of Germany, capital of a county of the same name, the house of whose sovereign is divided into several branches. It is seated on the river Lahn, 12 miles S.E. of Coblentz. Lon. 7. 42 E. Lat. 50 18 N.

NASSAUVIA, in botany, a genus of the class syngenesia, order polygamia segregata. Flowers clustered into a head, mixed with intervening scales; calyx four or five-flowered, double; the outer three-leaved, inner five-leaved; florets tubular, somewhat two-lipped, all hermaphrodite; receptacle naked, seeds crowned with four or five deciduous bristles. One species, a native of Magellan's Straits; stem ascending, clothed with imbricate leaves; flowers terminal, invested with ovate, acute scales.

NA'STILY. *ad.* (from *nasty*). 1. Dirtily; filthily; nauseously (*Bacon*). 2. Obscenely; grossly.

NA'STINESS. *s.* (from *nasty.*) 1. Dirt; filth (*Hayward*). 2. Obscenity; grossness of ideas (*South*).

NASTURTIUM. See Nasturtium indicum and Tropæolum.

Nasturtium aquaticum. (*nasturtium, quod nasum torquent*, because the seed when bruising irritates the nose). Water cresse. This indigenous plant, sisymbrium nasturtium of Linnéus, sisymbrium siliquis declinatis, foliis pinnatis, foliolis subcordatis, class tetradynamia, order siliquosa, grows plentifully in brooks and stagnant waters. The leaves have a moderate pungent taste, emit a quick penetrating smell, like that of mustard-seed, but much weaker. Water-cresses obtain a place in the materia medica for their antiscorbutic qualities, which have been long very generally acknowledged by physicians. The most pleasant way of administering them is in form of salad. See Sisymbrium.

Nasturtium hortense. Dittander.

This plant is the lepidium sativum floribus tetradynamiis; foliis oblongis, multifidis of Linnéus: it possesses warm, nervine, and stimulating qualities, and is given as an antiscorbutic, antisceptic, and stomachic, especially by the lower orders. See Lepidium.

Nasturtium Indicum. Greater Indian cress, or nasturtium. Tropæolum majus of Linnéus. This plant is a native of Peru; it was first brought to France in 1684, and there called La grande capucine. In its recent state this plant, and more especially its flowers, have a smell and taste resembling those of water-cress; and the leaves, on being bruised in a mortar, emit a pungent odour, somewhat like that of horse-radish. By distillation with water they impregnate the fluid in a considerable degree with the smell and flavour of the plant. Hence the antiscorbutic character of the nasturtium seems to be well founded, at least as far as we are able to judge from its sensible qualities: therefore in all those cases where the warm antiscorbutic vegetables are recommended, this plant may be occasionally adopted as a pleasant and effectual variety. Patients to whom the nauseous taste of scurvygrass is intolerable may find a grateful substitute in the nasturtium. The flowers are frequently used in salads, and the capsules are by many highly esteemed as a pickle. The flowers, in the warm summer months, about the time of sunset, have been observed to emit sparks like those of the electrical kind. See Tropæolum.

NA'STY. *a.* (*nast*, *nat*, German, wet.) 1 Dirty; filthy; sordid; nauseous (*Swift*). 2. Obscene; lewd.

NA'TAL. *a.* (*natal*, French.) Native; relating to nativity (*Camden*).

NATANT LEAF. In botany. A floating leaf. Placed on the surface of the water, in many aquatic plants; as nymphæa, potamogeton.

NATATION. *s.* (*natatio*, Lat.) The act of swimming (*Brown*).

NATATORY, in natural history, with legs or appendages formed for swimming.

NATES. (*nates*, from *nato*, to flow: because the excrements are discharged from them). In anatomy, the fleshy parts upon which we sit.

Nates cerebri. See Tubercula quadragemina.

NA'THLESS. *ad.* (*na*, that is, *not, the less*, Saxon.) Nevertheless: obsolete (*Milton*).

NA'THMORE. *ad.* (*na the more*.) Never the more: obsolete (*Spenser*).

NA'TION. *s.* (*nation*, Fr. *natio*, Latin.) 1. A people distinguished from another people. 2. A great number: emphatically (*Young*).

NA'TIONAL. *a.* (*national*, Fr. from *nation*.) 1. Public; general; not private; not particular (*Addison*). 2. Bigoted to one's own country.

National debt. See Debt and War.

NA'TIONALLY. *ad.* (from *national*.) With regard to the nation (*South*).

NA'TIONALNESS. *s.* (from *national*.) Reference to the people in general.

NATIONS. (See Gentes.) In natural history. The sense in which the word *cast* is used in the East Indies, best expresses the idea which Linnéus seems to have affixed to this word.

NA'TIVE. *a.* (*nativus*, Lat. *natif-ve*, Fr.) 1. Produced by nature; not artificial (*Davies*). 2. Natural; such as is according to nature; original (*Swift*). 3. Conferred by birth (*Denham*). 4. Pertaining to the time or place of birth (*Shakspeare*). 5. Original; that which gave being (*Milton*).

Na'tive. *s.* 1. One born in any place; original inhabitant (*Bacon*). 2. Offspring (*Shakspeare*).

NA'TIVENESS. *s.* (from *native*.) State of being produced by nature.

NATI'VITY. *s.* (*nativité*, French). 1. Birth; issue into life (*Bacon*). 2. Time, place, or manner of birth (*Shakspeare*). 3. State or place of being produced (*Milton*).

Nativity, in astrology, the scheme or figure of the heavens, and particularly of the twelve houses, at the moment when a person was born; called also the horoscope.

To cast the nativity, is to calculate the position of the heavens, and erect the figure of them for the time of birth.

NATOLIA, a country, formerly called Asia Minor. It is the most western part of Turkey in Asia, extending from the Euphrates as far as the Archipelago, the strait of Gallipoli, the sea of Marmora, and the strait of Constantinople. It is bounded on the N. by the Black Sea, and on the S. by the Mediterranean. The air is temperate and wholesome, and the soil generally fertile. It is crossed by a chain of mountains, formerly called Taurus, from E. to W, and watered by a great number of rivers.

NATRIX, in zoology. See Torquatas.

NATROLITE, in mineralogy, a species of zeolite possessing a crystalline form, but distinguished from the other species of zeolite by possessing a considerable quantity of soda, and no lime. See Zeolite.

NATRON. See Soda and Natrum.

Natron murimatum. See Murias sodæ.

Natron præparatum. Soda preparata. Sal sodæ. Alkali minerale aeratum. This salt consists of soda saturated with carbonic acid, and is therefore called carbonas sodæ in the new chemical nomenclature. It is given in doses of from ten grains to half a drachm as an attenuant and antacid; and, joined with bark and aromatics, it is highly praised by some in the cure of scrophula. It is likewise a powerful solvent of mucus, a deobstruent and diuretic, and an antidote against oxyd of arsenic and the corrosive sublimate. The other diseases in which it is administered are those arising from an abundance of mucus in the primæ viæ; calculous complaints, gout, some affections of the skin, rickets, tinea capitis, crusta lactea, and worms. Externally it is recommended by some in the form of lotion, to be applied to scrophulous ulcers. See Alkali minerale and Soda.

NATRON TARTARISATUM. Sal Rupellensis. Sal polychrestum Seignetti. Alkali minerale tartarisatum. This preparation is a combination of the acid of tartar with soda, and called in the new chemical nomenclature tartris sodæ. It possesses mildly cathartic, diuretic, and deobstruent virtues, and is administered in the dose of from half an ounce to an ounce as a cathartic, and in the dose of from twenty to thirty grains in abdominal physconia, and torpidity of the kidneys.

NATRON VITRIOLATUM. Alkali minerale vitriolatum. Sal mirabile seu catharticus Glauberi. Glauber's salt. This preparation being a sulphat of the mineral alkali is termed sulphas sodæ in the new chemical nomenclature. It possesses cathartic and diuretic qualities, and is in high esteem as a mild cathartic. It is found in the mineral kingdom formed by nature, but that which is used medicinally is prepared by art.

NATRUM, in mineralogy, a genus of the class salts: of a caustic taste, effervescing with acids, with oil forming soap, changing blue vegetable juices green, rendering acid solutions of earths and metals turbid. Four species.

1. N. antiquorum. Oriental alkali. Mineral alkali. Soda. Natron. Inodorous, dry, nearly pure. Found in China, Bengal, Persia, Syria, Egypt, South America, Denmark, Switzerland, and Hungary, generally during the spring and summer in a state of whitish efflorescent powder, and most usually combined with a greater or less portion of earth, common salt, acid and various substances; totally soluble in water, and after evaporation running into four-sided prismatic crystals, terminating on each side in needle-like points, which on exposure to the air soon moulder into a snowy impalpable powder; with quick-lime and oil forming soap, and with silica glass; easily melting in the fire.

2. N. acidulare. Acidulated mineral alkali. Inodorous, dissolved in water. Found in warm and acidulous baths of Seltzer and various parts of Germany, and in the lakes between Alexandria and Rosetta.

3. M. murorum. Aphronite. Calcareous alkali. Inodorous, mixed with carbonet of lime. Found in old walls cemented by lime, and sometimes in marble rocks, efflorescing like frost, and is not totally soluble in water.

4. M. volatile. Volalkali. Volatile alkali. Fetid aphronite. Halinitron. Fetid, mixed with earths and other salts. Found in various soils, in chalk, swinstone, argils, and often in the natron of old walls: its odour originating in the ammonia of decayed living bodies.

Natron, or soda, is also secreted very largely by animals of all kinds, and constitutes a part of almost all the secerned fluids of the body, as the tears, urine, matter of perspiration, bronchial mucus, &c.

It is also secreted very largely by an extensive family of plants, whose salts obtained by burning constitute, in a pure or impure state, a very considerable article of traffic, and is usually sold under the name of barilla, or kelp. The chief plants of this description are the following:

Salsola sativâ, Lin. Salsola sonda. Lofling. Kali hispanicum supinum annuum fedi-foliis brevibus. Kali d'Alicante. It grows abundantly on that part of the Spanish coast which is washed by the Mediterranean sea. This species is deservedly first enumerated by professor Murray, as it supplies all the best soda consumed in Europe, which by us is called Spanish or Alicant soda, and by the Spanish merchants barilla de Alicante.

Salsola soda, Lin. Kali majus cochleato semine. Le salicor. This species, which grows on the French Mediterranean coast, is much used in Languedoc for the preparation of this salt, which is usually exported to Sicily and Italy.

Salsola tragus, Lin. affords an ordinary kind of soda, with which the French frequently mix that made in Languedoc. This adulteration is also practised by the Sicilians, who distinguish the plant by the term salvaggia.

Salicornia herbacea, Lin. is common in salt marshes, and on the sea shore, all over Europe. Linnæus prefers the soda obtained from this plant to that of all the others; but though the quantity of fossil alkali which it yields is very considerable, as a great portion of it is united with muriatic acid, it is mixed with much common salt.

Salicornia arabica, Lin. Mesembryanthemum nodislorum, Lin. Plantago squarrosa, Lin. All these, according to Alpinus, afford this alkali. It has also been procured from several of the fuci, especially F. vesiculosus, and distinguished here by the name kelp. Various other marine plants might also be noticed as yielding barilla or soda by combustion; but the principal are confined to the genus salsola, and that of salicornia. The salsola kali, on the authority of Rauwolf, is the species from which the salt is usually obtained in eastern countries.

It is to be regretted, that the different kinds of soda which are brought to European markets have not been sufficiently analysed to enable us to ascertain with tolerable certainty the respective value of each; and indeed while the practice of adulterating this salt continues, any attempts of this kind are likely to prove fruitless. The best information on this subject is to be had from Jussiba, Mascorelle, Cadet, Borlare, and Sestini. In those places where the preparation of soda forms a considerable branch of commerce, as on the coast of the Mediterranean, seeds of the salsola are regularly sown in a proper situation near the sea, which usually shoot above ground in the course of a fortnight. About the time the seeds become ripe the plants are pulled up by the roots, and exposed in a suitable place to dry, where their seeds are collected; this being done, the plants are tied up in bundles, and burned in an oven constructed for the purpose, where the ashes are then while hot continually stirred with long poles. The sa-

fine matter, on becoming cold, forms a hard solid mass, which is afterwards broken in pieces of a convenient size for exportation.

The Spanish soda, of the best sort, is in dark-coloured masses, of a blueish tinge, very ponderous, sonorous, dry to the touch, and externally abounding with small cavities, without any offensive smell, and very salt to the taste; if long exposed to the air, it undergoes a degree of spontaneous calcination. The best French soda is also dry, sonorous, brittle, and of a deep blue colour, approaching to black. The soda which is mixed with small stones, which gives out a fetid smell on solution, and is white, soft, and deliquescent, is of the worst kind. The method of purifying this salt is directed in the London pharmacopœia, under the article of natron præparatum, and in the Edinburgh pharmacopœia under that of sal alkalinus fixus fossilis purificatus. The pure crystals, thus formed of Alicant barilla, are colourless, transparent, lamellated, of a rhomboidal figure, and one hundred parts are found to contain twenty of alkali, sixteen of aerial acid, and sixty-four of water; but upon keeping the crystals for a length of time, if the air be not excluded, the water evaporates, and they assume the form of a white powder. According to Inslin, one ounce of water at the temperature 62 of Fahr. dissolves five drams and fifteen grains of the crystals. The same author also found that this salt, though not so long as the vegetable alkali-natron, has been thought useful in scrophulous disorders, but it is seldom given in its simple state.

Soda, or the mineral alkali as it is termed, is in common use in the manufacture of glass and soap; and as the latter is an article of the materia medica, it will be proper to consider its medicinal effects in this place.

All the soaps, of which there are various kinds, are composed of expressed vegetable oils, or animal fats, united with alkaline lixivia. The sapo ex oleo olivæ et natro confectus of the London pharmacopœia, or the sapo albus crispanus of the Edinburgh pharmacopœia (white Spanish soap), being made of the finer kinds of olive-oil, is the best, and therefore preferred for internal use. Soap was imperfectly known to the ancients. It is mentioned by Pliny as made of fat and ashes, and as an invention of the Gauls. Aretæus and others inform us, that the Greeks obtained their knowledge of its medical use from the Romans. Its virtues, according to Be[illegible], are detergent, resolvent, and aperient, and its use recommended in jaundices, gout, calculous complaints, and in obstructions of the viscera. The efficacy of soap, in the first of these diseases, was experienced by Sylvius, and since recommended very generally by various authors who have written on this complaint; and it has also been thought of use in supplying the place of bile in the primæ viæ. The utility of this medicine in icterical cases was inferred chiefly from its supposed power of dissolving biliary concretions; but this medicine has lost much of its reputation in jaundice, since it is now known, that gall-stones have been found in many after death, who had been daily taking soap for several months, and even years. Of its good effects in urinary calculous affections we have the testimonies of several, especially when dissolved in lime water, by which its efficacy is considerably increased; for it thus becomes a powerful solvent of mucus, which an ingenious modern author supposes to be the chief agent in the formation of calculi; it is however only in the incipient state of the disease that these remedies promise effectual benefit, though they generally abate the more violent symptoms where they cannot remove the cause. With Boerhaave soap was a general medicine; for as he attributed most complaints to viscidity of the fluids, he and most of the Boerhaavian school prescribed it, in conjunction with different resinous and other substances, in gout, rheumatism, and various visceral complaints. Soap is also externally employed as a resolvent, and gives name to several officinal preparations.

NATTAM, a town and fortress of the peninsula of Hindustan, in the country of Madura, 18 miles N. of Madura, and 45 S.S.W. of Trichinopoly. Lon. 78. 13 E. Lat. 10. 10 N.

NATTIER (John Mark le), a French painter. His designs for the Luxemburg gallery have been engraved and printed, folio, 1710. He was professor in the academy of painting, and was patronized by Lewis, but he declined the liberal invitations of the czar Peter to settle in Russia. He died 1766.

NATURAL. *a.* (*naturel*, French.) 1. Produced or effected by nature (*Wilkins*) 2. Illegitimate; not legal (*Temple*). 3. Bestowed by nature; nor acquired (*Swift*). 4. Not forced; not farfetched; dictated by nature (*Wotton*). 5. Consonant to natural notions (*Locke*). 6. Tender; affectionate by nature (*Shakspeare*). 7. Unaffected; according to truth and reality (*Addison*). 8. Opposed to violent: as, *a* natural *death*.

NATURAL ACTIONS. Natural functions. Those actions by which the body is preserved, as hunger, thirst, &c. See FUNCTION.

NATURAL CHARACTER of vegetables. That which delivers all possible certain characteristic marks of the fructification: and may therefore be used under any system or arrangement. Such characters are given by Linnéus in his Genera Plantarum; from the number, figure, situation, and proportion of the parts; rejecting taste, smell, colour and size.

NATURAL CLASS. An assemblage of several genuses of plants, agreeing in their parts of fructification, general appearance, and qualities. We have instances of such in the umbellatæ, verticillatæ, siliquosæ, leguminosæ, compositæ, gramina, &c.

NATURAL HISTORY. The history of the natural products of the earth, whether minerals, vegetables, or animals; and bearing the same relation to natural philosophy as physiology

does to physics. It has obviously therefore a near approach to various other studies; as for instance, those of oryctology, chemistry, comparative anatomy, zoonomy, husbandry, and gardening; and, but that it would tend to place the term in a different sense from that in which it has of late years been regarded, it might correctly enough be contemplated as that peculiar genus of science of which all the preceding are only species.

Natural history is a science both useful and entertaining: as it comprehends animals, vegetables, and fossils; air, earth, and sea, with all their inhabitants and productions; it may be said to include the knowledge of all nature, and to present an inexhaustible fund of inquiry and of amusement. It is intimately connected with all the other sciences; and with all the arts, from the simplest and rudest, to the most complicated and the most elegant. While we look around us, we cannot avoid becoming more or less acquainted with the manners of animals, the œconomy of vegetables, and the general appearances of nature. From an acquaintance with these many advantages have already accrued to man; and from a more intimate knowledge of them, many more may still be derived. The comfort and happiness of all ranks may, in some degree, be said to depend on the knowledge of natural history. The husbandman needs to know the characters of the tame animals which he employs; what advantages are to be derived from them; whether there are others that would suit his purpose better; where they are to be found; how they may be procured, and how supported; the qualities of the soil which he cultivates, and the means of managing and of improving it; the nature of the grain which he raises, and whether he might not, with advantage, substitute a different species for that in common use. Even the meanest mechanic must have a pretty accurate knowledge of many of the qualities of those natural objects with which his craft is connected. The fine arts, though usually considered as the peculiar province of imagination, depend greatly upon natural history. Both in music and painting, the study of nature alone can ensure success. In the writings of the poets, images are perpetually introduced from external nature; and allu[illegible] fr[illegible]ade to the manners and œconomy of the animal tribes. Many of the transformations, celebrated by Ovid, are founded on facts in the natural history of animals and plants; and Lucretius and Virgil are very minute in describing the habits of various tame animals, and many species of the vegetable kingdom: nor are such parts the least valuable of their writings. As modern poets have not the same machinery of gods and goddesses, nymphs, fawns, and satyrs, which were so serviceable to the heathen poets; as they cannot employ elves, witches, ghosts, or the wonders of enchantment, with so much advantage as the writers of the old romance; let them be more industrious in studying the scenes of Nature: these are so endlessly diversified, that they must always continue to afford abundance of the richest materials for the poet's art;—materials, which have this advantage over allegory and fiction, that they are durable as the constitution of things. By attending to this principle, Thomson, while he led the way to others, has procured for himself a distinguished place among those whose names are immortal.

From the vicissitudes of the seasons acting upon the senses; from the presence of surrounding objects; from the necessity of deriving from them food, clothing, and shelter, natural history must have been a study of the first importance to man, and attended to from the earliest periods of society. Before the invention of letters, however, the observations and the discoveries of individuals were neither likely to be communicated to those at a distance, nor recorded for the information of those that should come after. In a more polished state of society the case is widely different: and hence we find Alexander the Great decreeing a collection of animals for the examination of Aristotle; and wild beasts, from every quarter of the globe, produced and exhibited in the amphitheatres at Rome. Yet Aristotle is almost the only ancient writer on zoology that merits attention: for even Pliny and Ælian, with this great example before their eyes, offer us nothing but crude collections, discriminated with little taste or judgment, truth and falsehood being blended in one common mass: and for many succeeding years, from various causes, all Europe is well known to have been immersed in ignorance and credulity.

Though natural history was not one of the favourite studies of the revivers of literature; yet the scholars of that period displayed a degree of industry, which, to many of the triflers of the present day, may appear incredible. The voluminous labours of Gesner and Aldrovandus are illustrious instances. These are rude quarries from which some valuable materials may be dug by such as will undergo the fatigue, and possess the judgment necessary to turn them to a good account.

Towards the end of the last century the science began to be more generally cultivated. Among our countrymen, Ray, Woodward, Collinson, and Edwards, prosecuted its study with singular success, and have been followed in the same track by many others, scarcely inferior in industry or abilities; none of whom however are more entitled to praise than the indefatigable Pennant. But to the celebrated Linnéus is justly attributed the honour of having first formed natural history into a system: and he may hence perhaps be reckoned its greatest benefactor. The eloquent Buffon, by so happily uniting extensive knowledge, ingenuity, and elegance, hath also contributed, in a signal manner, to diffuse, among all the various ranks of society, an ardent desire to obtain a more intimate acquaintance with the same study: and his attempts have been ably seconded by those of Wildenow, Pulteney, Shaw, and Smith.

A science, when taken in its full extent, so intimately connected with all the necessary and the fine arts, forming the basis of the other sciences, and more useful than any of them for the ordinary purposes of life, can never be too generally or too industriously cultivated. It is with the utmost propriety therefore that books on natural history [illegible]ut into the hands of the young. If such books [illegible]e rendered interesting (and there is no reason why they should not be), they cannot fail of being eminently useful. And it is under this impression that we have dilated ourselves in the present work to the utmost extent we have been able, so as to find space for a description in all instances sufficiently detailed to become attractive and produce effect; and have been cautious in selecting for our descriptions those species whose forms or habits, or other singularities, are most striking and worthy of notice: while we have uniformly introduced into the body of the work an easy explanation of those scientific or technical terms upon which the accuracy of the science in a great degree depends; which we have found it, indeed, impossi-

ble to exchange for others, and which we should not have exchanged if we could.

To the animal kingdom, however, we have and shall still continue to pay the greatest degree of attention, as the most interesting and perfect department of the whole. The variety of the parts of an animal body, the happy perfection of the structure in which these are united, the diversity of forms which this order of beings exhibits, the powers of feeling, motion, and action, with which they are endowed, and indeed all their qualities, and all the circumstances of their existence, concur to establish them in this transcendent rank among the works of creation. The mineral kingdom presents many beauties and wonders to our observation, and the more we investigate it, more beauties and wonders it developes. Yet its want of organization and life renders it the lowest of the three divisions of natural science. The vegetable department displays organization and life; the individuals belonging to it increase in size by growth, which enlarges all their parts in due proportion, and not by the simple accumulation of homogeneous matter; and it exhibits such a multiplicity of beautiful forms, and such variety, richness, and elegance of colouring, that it is to be considered as superior to brute matter, and as approaching much nearer to the dignity of the animal creation. But still, when from the contemplation of these two kingdoms of nature we raise our views to animals, a train of nobler objects appear before us; our curiosity is more powerfully excited; our attention more closely fixed; and our minds are elevated and enlightened by a set of new and grander ideas.

He who studies nature with a careless eye, only appears to distinguish the animal from the vegetable, and the vegetable from the mineral kingdom: he notices not the nice gradations by which these different orders of beings run, as it were, into one another; he marks only the more prominent features, and the more glaring colours: the more remarkable differences force themselves upon his observation; but he passes on too rapidly to discern, or even examine whether these are seeming or real, whether they are divided by a firm and insuperable barrier, or connected by intermediate links. It never occurs to the vulgar, that animals and vegetables may possibly be one order of beings, or that any of the vegetable tribes are nearly allied to some parts of the mineral kingdom. They would laugh to hear a philosopher declare himself at a loss to give such a definition of any one of these divisions as might absolutely exclude the others.

Yet philosophers have actually felt this difficulty, and still continue to feel it. When they find animals fixed to a particular spot, extremely imperfect in their powers of sensation, and displaying scarcely any instinct or sensorial power, they can hardly consider them as endowed with any principle superior in its nature to vegetative life. Again, when they observe plants unfolding to the rays of the sun their leaves or flowers, which shrink together at the fall of night; receding, as if afraid of injury from objects that approach them; and, in whatever situation the seed be sown, or the shoot planted, constantly growing in that direction in which they can best enjoy the influence of light and air; it appears at first sight almost unfair to deny this class of beings sensations, desires, and even design. The sensibility of the *mimosa*, the art of the *dionæa muscipula*, the affectionate care with which the leaves of the tamarind tree contract and wrap themselves round the tender fruit, to protect it from the nocturnal cold, are so many instances in which vegetables make an approach towards some of the most eminent characteristics of animals. The oyster and other shell fishes, and almost all zoöphytes, though ranked in the animal kingdom, seem, again, to possess few of the privileges of animal life.

The analogies between animals and vegetables, which have been traced by philosophical observation, occasion other difficulties in the attempt to fix the boundary between these two kingdoms. The bodies, as well of plants as of animals, consist of fluids and solids; they have both vessels designed to contain the fluids, and glands to secrete different juices: while the blood circulates through the bodies of animals, the sap of vegetables ascends and descends, so as to produce the same effects on the vegetable, which the motion of the blood by the force of the heart and the arteries produces on the animal system. These are but a few of the resemblances which have been observed between the species of the animal and those of the vegetable kingdom. Almost every one of the parts common to animal bodies has been represented by one naturalist or another as matched by some correspondent part in vegetable bodies. Such analogies are sometimes plain and striking, and sometimes scarce perceptible, or merely imaginary. They afford, however, an agreeable subject of speculation; and it cannot be denied that they increase the difficulty of ascertaining the limits by which these two departments of nature are divided.

But, however numerous and strong the analogies between animals and vegetables, however difficult it may be to discern the precise line which separates the one kingdom from the other; yet the leading characteristics are sufficiently distinct. The privileges which animals enjoy above the other parts of the creation are in most instances highly conspicuous.

One of the most eminent of these privileges is their power of loco-motion. Klein, with sufficient propriety, assumes this as the great characteristic by which animals may be distinguished from the other orders of beings. It does not hold indeed in every instance, for there are some plants of a nature almost as wandering as the most migratory of the animal tribes; such as the *fragaria*, or strawberry, as a land-plant, and the *valisneria* as an aquatic: but these anomalies are not common, and vegetables may in general be regarded as destitute of loco-motion. They seem to enjoy a species of life, and display on many occasions a degree of sensibility, or something very like it; but they are fixed, each to a peculiar spot, where they spring up, expand into full growth, and at length wither and decay. Animals, without suffering any external impulse, readily move from place to place, by virtue of an inward principle, superior in its nature to vegetative life. Some enjoy this power or property in a more eminent degree than others; some are more disposed than the rest of their fellows to exert it; and some, again, possess the power in a very inferior degree, and discover but a very faint inclination to avail themselves of it. We admire the rapid flight of the eagle, and the swiftness of the horse and the greyhound; we observe many of the swiftest and most vigorous animals sink into lethargic indolence, till roused by some peculiarly powerful motive; the snail, the sloth, but more particularly the oyster, the limpet, and other shell-fishes, both in their powers of self-motion, and in their dispositions to exert them,

wise but very little above those vegetables which are more remarkable for sensibility. This property, however, though not uniformly the same in all animals, seems to belong, in one degree or another, to every being that can be ranked in this class; and it is sufficient to distinguish them remarkably, in all the circumstances of their existence, from those from whom Nature has withheld it.

But this is not the only property on which the dignity of the animal character depends. To be capable merely of moving from one situation to another by virtue of their natural powers, would not greatly exalt this department of beings. A mineral or vegetable, with self-motion superadded to its other properties, would not be much superior in dignity to what it naturally is without any such addition. Sensation then is usually regarded as another characteristic of animals: it is intimately connected with their powers of loco-motion, and even necessary to prompt them to the exertion of those powers. Did I not feel, I should never be roused to action. Yet several vegetables, among which the mimosa or sensitive-plant is one of the most remarkable instances, appear to possess something like sensibility. It is scarce possible to determine upon what principle in their nature the emotions which these kinds of plants display on certain occasions may depend. Is it owing to something peculiar in the structure of their parts, or in the matter of which they are formed? or are they actually informed by a sentient principle? This is perhaps one of those intricate cases in which truth is removed from our view, even beyond the reach of experiment. Yet, if we may fairly venture on this occasion to reason from general analogy, we must conclude that these plants are equally destitute of a conscious, sentient principle with the other kind of the vegetable kingdom. The structure of their parts is not that of an animal, but of a vegetable body: they are, like other vegetables, fixed to a particular spot: in all their other characters, too, they resemble not animals but vegetables; and even those phænomena, in which it may be imagined that they display indications of sensibility, are of such a nature that no decisive inference can be deduced from them.

Animals are endowed with various organs and powers of sensation, which serve to make them acquainted with the different properties of surrounding objects. Most of them see, hear, taste, touch, and smell. They all possess these, or a part of these powers of sensation, in an unequivocal manner. The senses are not indeed equally perfect in all; and some species appear to enjoy only a part of them. In some animals, the sight, the hearing, the touch, the taste, or the smell, is remarkably dull; and in others exquisitely delicate and acute. The eye of the mole receives but a faint glimmer of light; the ear of the ass is insensible to the harmony or melody of sounds; the sight of the ounce, on the contrary, is wonderfully acute; and the touch of the spider exquisitely delicate. Possibly the same feelings may not communicate to all animals the same images and sentiments: what is sweet to one animal may perhaps be bitter to another; what is beautiful to one species, may appear to another ugly or disagreeable; an odour, which to this animal is sweet-smelling, may be a stench in the nostrils of that. All sensations, however, communicate to the animal some useful knowledge of the qualities of surrounding objects; some knowledge suitable to his character and his circumstances.

But sensibility requires the beings to whom it belongs to possess some superior powers. Organs of sensation serve merely to carry on an intercourse between some internal principle in the animal possessed of them, and external nature. This internal principle exalts animals highly above every other arrangement of beings; and is, besides, so much diversified in different kinds and species of animals, and in different individuals, as to create the most remarkable distinctions among them. Perception must be common to all animals; without it, organs of sensation would be useless. Perception is indeed scarce any thing else but another word for sensibility: the only difference seems to be, that the former is scarce so strongly expressive a term as the latter. Memory appears to be no less necessary to animals than perception; to receive impressions from external nature would be but a trifling privilege, were those impressions of so evanescent a nature as to be effaced the next moment after they were communicated. Animals, without this power, could perform no voluntary functions. To render them equal to such functions, it seems indispensably necessary that they be able to connect the past with the present. Accordingly, every animal whose manners and œconomy have been observed with any considerable degree of attention appears to be more or less capable of remembrance. The docility of the domestic animals is a sufficient proof that they are endowed with this faculty: the cunning, and even the ferocity of beasts of prey, prove the same fact with respect to themselves: the complex and wonderful œconomy of the bee, the beaver, the crow, the birds of passage in general, and various others of the inferior animals, whose manners have been often contemplated with admiration, shews that their retentive powers are remarkably tenacious of the impressions made upon them. The human species possess the faculty of memory in a very eminent degree; and the arts by which they have learned to improve and assist it, render it a more important feature in their character, than in that of any of the other species in the animal creation.

But we cannot conceive a being to possess the powers of perception and memory, and yet not be conscious of its existence: this consciousness must therefore be allowed to be another of the internal powers of animals. With the powers of perception, remembrance, and consciousness, animals are observed to be also endowed with certain affections, and to be susceptible of certain emotions. Joy, grief, love, hatred, gratitude, resentment, fear, courage, with a number of other similar principles, reside in the human breast, and are to man the great springs of action. The inferior animals appear to be susceptible of the same emotions, and capable of many both of the selfish and the social affections which distinguish the human character. But neither do all the species or individuals of any one kind possess all these affections and passions in the very same degree; nor are the dispositions and affections of the different kinds in any respect the same. One kind or species is ferocious and cunning; in another courage appears united with noble generosity: one is remarkable for sloth and listless inactivity; another is restlessly active: one is grateful, submissive, and affectionate; another of a froward, untameable spirit, insensible to kind-

ness, and incapable of attachment: one is docile and intelligent; another dull and stupid. Besides these emotions, affections, and passions of a more generous and refined nature, animals are likewise subject to certain appetites and feelings of a different sort: such are the appetites for food, and for the procreation of the species; the sense of bodily pleasure, and of bodily pain. These are more uniformly common to animals in general than the former: to receive the requisite supplies of food, and to reproduce the species, are properties still more essential to the animal character than the more refined sentiments and affections.

The internal qualities which have been enumerated are generally allowed to be common to all the more perfect animals, although diversified in different species, and different individuals. But even these,—the power of self-motion, organs of sensation, perception, consciousness, memory, appetites, affections, and passions,—are not sufficient to complete the character: they need some other powers to call forth, to regulate, and to restrain their energy; something on which they may act, and which may connect them, as it were, with one another. Animals are actually endowed with other internal powers than those yet mentioned: they compare objects presented to them; they judge between the true and false; between nearness and distance: they distinguish between beauty and deformity; they can discern order from confusion. Their other powers furnish, as it were, the materials; these combine and separate, and arrange them. The operation of these several faculties is succeeded by the determination of the will; a power which is necessary to complete the character of a thinking, animated being. No circumstances in the situation of animals, no particulars in their form, or bodily powers, or mental dispositions, give rise to more remarkable disparities among them, than those which depend on their powers of comparing, and of judging between different objects. These hold so important a rank among the other powers, that, wherever they are in the smallest degree diversified, they produce the most remarkable diversities of character.

By their superiority in these respects the human species is eminently distinguished above the rest of the animal kingdom; so eminently, indeed, that they are the lords of all other beings, and the rest are their slaves, or unequal enemies. The same law prevails throughout all animated nature. The more perfect the powers of comparing and judging in any particular order or kind, so much the more powerful, respectable, and happy is that division. Superior address often renders a smaller and more timid animal an over-match for one that is larger, stronger, and even more ferocious.

But the inferior animals are so remarkably deficient in the reasoning and thinking powers, when compared with man, that human pride has been tempted to deny them entirely the possession of such powers. Though we find them such useful assistants, and at times such formidable enemies, we would willingly degrade them to a rank in the order of creation still lower than that which nature has assigned them. We delight to represent them as destitute of judgment, and guided only by what we call instinct. We observe that even the most sagacious among them are incapable of that variety of minute distinctions which our reasoning faculties enable us to make:—they cannot take so full a review of the past, nor look forward with so penetrating an eye towards the future: they do not accumulate observation upon observation, or add to the experience of one generation that of another: their manners do not vary, nor their customs fluctuate, like ours: their arts remain always the same, and are not liable either to degenerate, or to be improved: the crow always builds its nest in the same way; every hen treats her young with the same measure of affection; even the dog, the horse, and the sagacious elephant, seem to act rather by association than with design. From such hasty observations as these it was inferred by Descartes, that brutes are directed in their actions by some mysterious influence, which impels them to employ their powers mechanically and unintentionally in performing actions beneficial to themselves, and suitable to their nature and circumstances.

There are opposite opinions, however, that have been carried to as wide an extreme. One of the greatest philosophers among the ancients, Pythagoras, was so fully convinced that the brutes possess the same powers of intelligence as men, that he represented them to his disciples as animated by souls which had previously acted a part in human bodies, and, for that reason, enjoined them to treat those their humbler brethren with gentleness and humanity, and to beware of ever shedding their blood. The same opinion still prevails through the cast; and has such an influence on the manners of the Gentoos, that they will perish of hunger rather than shed the blood or eat the flesh of an animal.

This opinion, as well as that which degrades the brutes to the low character of pieces of mere machanism, have equally originated from prejudice or careless observation. Since natural history has begun to be more diligently cultivated, innumerable observations made on the manners and œconomy of the inferior animals prove, that, if they be guided by instinct, that instinct is by no means a mechanical principle of action, but, in its nature and susceptibility of improvement, approaching nearly, in many cases, to the character of human reason. The manners of no one species among the brutes are uniformly the same in all the individuals belonging to it. Even in performing those actions in which they are said to be guided by unvarying instinct, different individuals display different modes of conduct. It is probable, that if we were to examine their manners and œconomy with the same minute and careful attention with which we observe the conduct of our own species, we should find those of their actions which we call instinctive much more diversified than we imagine: the general resemblance,—the family likeness, would no doubt still hold; but we should surely discover the character of the individual to be distinctly marked, as well as that of the species. The laws of analogical reasoning do not justify the idea that the brutes act, on any occasion, absolutely without design. In many instances they undeniably act with design: the dog obeys his master; he traces his footsteps in order to overtake him: he even attempts to make returns of gratitude for the kindness with which he is treated. Others of the inferior animals behave in a similar manner. It seems therefore more probable that such animals, even in those instances in which we cannot distinguish the motives which actuate them, or the causes by which they are instigated, act not altogether without design, and extend their views,

if not a great way, yet at least a certain length forward,—than that they can be, upon any occasion, influenced by anomalous feeling, or over-ruled by some mysterious influence, under which they are nothing but insensible instruments.

The facts from which this induction is drawn have of late forced themselves on observation, in such a manner as to give rise to a very false theory of a kind still different: in which it has been thought better to degrade mankind nearer to the same level with the brutes, than to elevate the brutes to the rank usually assigned to mankind. The human mind has been represented as a bundle of instincts, only a little larger than those bundles of the same materials which have been bestowed on the brute creation. Observing, that the inferior animals seem, on many occasions, to act upon the same principles with mankind, and unwilling to allow that the former can ever act with design; the author of this theory has contrived to explain the phænomena by denying design to his own species.

But we will not tamely surrender our rights: we will share them with other animals rather than be entirely deprived of them. We are conscious of comparing ideas and of forming designs. If these operations be called instincts,—be it so; this is not to advance a new doctrine, but to propose the use of it in a new sense. Let mankind still be allowed to reason, and to act with design, even though it must be granted that the brutes too reason, but not so skilfully, and form designs, but designs much less extensive than those of mankind.

We not only accomplish such purposes as we propose to ourselves, by the use of such means as prudence suggests; but we are also subject to laws, by the influence of which our conduct, whatever it be, naturally produces certain effects on our character and circumstances, which we neither previously desired nor foresaw. The drunkard, for instance, sits down only to swallow a liquor of which he is fond, or to join in that noisy mirth which reigns among his fellows; but he insensibly acquires a habit which he did not think of, and by indulging in that habit, unintentionally produces very unhappy changes in his health and circumstances. The benevolent man, in the same manner, when he interferes to relieve his brother in distress, does not probably attend to all the effects which his conduct, in this instance, is likely to produce, either to himself, or to the person whom he relieves: and of human actions in general it may be observed, that their consequences always extend much farther than the design or foresight of the agent. Beings of superior intelligence might regard mankind as incapable of design, with just as much reason as we have to deny the brutes any guiding principle superior to blind and simple instinct. We, however, are conscious of design; though our designs are commonly narrow, and our views limited: why, then, consign the inferior animals, in every instance, to the guidance of an unmeaning impulse? Were it proper to enter more minutely at present into a discussion of this point, it might be easy to prove, by an induction of particulars, that brutes actually compare ideas and deduce inferences; and when we consider their docility, and mark the variety of their manners, it appears almost absurd to deny that they form designs, and look backward on the past, and forward towards the future, as well as ourselves.

We may conclude, then, with respect to inferior animals, that they possess, in general, the powers of perception, memory, consciousness; with various affections, passions, and internal feelings; and even, though perhaps in a meaner degree, those powers of comparing and judging which are necessary to enable an animated being to form designs, and to direct its actions to certain ends. Their prospects towards the future are evidently very confined: they cannot review the past with such a steady eye as man; imagination is not, with them, so vigorous and active as with us; it is limited within a much narrower range. But still they are not absolutely confined to present sensations; they connect some part of the past and of the future with the present. When we contemplate their manners, we behold not social intercourse regulated among them by the same forms as among men: their characters and circumstances differ so considerably from ours, that though the great outline of right and wrong may, wherever perceived, remain the same to them as to us; yet the application of that outline to particular cases must be very different among them from what it is with ourselves. Thus, philosophers have fancied imaginary states of human society, in which the present laws of distributive and commutative justice could not be observed: but even in such states of society, the fundamental principles of justice would continue obligatory, and would only be varied in their application. Brutes appear, in short, to possess, but in a more imperfect degree, many of the same sensitive faculties as mankind. Instinct must always be a simple principle, an original feeling; the only business of which is to rouse to action,—to call the reasoning or comparing powers to exert themselves. To talk of instinctive principles that admit of improvement, and accommodate themselves to circumstances, is merely to introduce new terms into the language of philosophy. No such improvement or accommodation to circumstances can ever take place without a comparison of ideas, and a deduction of inferences. When we consider with how much difficulty that acquaintance with the manners and customs of mankind, which we call knowledge of the world, is obtained, we cannot be surprised that even philosophers should be so imperfectly acquainted with the more minute particulars in the manners and œconomy of the brutes. To man their manners are much less interesting than those of his own species; and there are, besides, many difficulties to prevent us from becoming intimately acquainted with them, however earnestly we may turn our attention to this object.

If to these powers by which animals are so eminently distinguished above the species of the vegetable and the mineral kingdom, we add the peculiarities of their form, of the structure of the interior parts, and of their exterior covering,—the happy adaptation of all their organs to the purposes for which they seem intended by nature,—and the wise provision by which they are enabled to continue their kind; we cannot but consider them as constituting by far the most eminent order among the works of creation. They alone are capable of happiness. The rest of the universe seems to be intended for their accommodation. The enjoyments which they are formed to receive, the duties which they are destined to fulfil, and the laws by which the duty and the happiness of all animals are so closely connected, afford the most eminent proofs of the perfection of the divine nature, that the works of creation exhibit. The

inferior parts of nature are beautiful, or grand, or regular, only in proportion as they are formed to excite certain sentiments in the minds of animated, thinking beings; at least, were they not calculated to contribute to the happiness of such beings, by communicating to them agreeable sentiments, their order, magnificence, and beauty, would be lost, or incapable of serving any visible end.

Yet all this has no possible connexion with the possession of an accountable and immortal principle. Matter and spirit are equally the works of the Creator, and perhaps equally created out of nothing—for we have no more reason beyond what our own pride would suggest to us, to conceive that spirit is an emanation or extension of the essence of the Creator than that matter is. Each of them, therefore, as the works of an omnipotent and benevolent Creator, is entitled to reverence. Brutes are not immortal, for they have no principle that is designed to be so: but till it be demonstrated that the plastic substance of matter, admitted to be capable of instinct, is necessarily and absolutely incapable of consciousness, memory, reflexion, and judgment, the experienced train of facts daily and hourly starting around us should reasonably induce us to believe them possest of these internal senses in conjunction with mankind, though in a far subordinate and less perfect degree.

Natural history, then, comprises in its general scope the history of minerals, plants, and animals: the first of which differ from the two last by being produced fortuitously, growing by external accretion, or the mere juxtaposition of new matter alone; and being only capable of destruction by mechanical or chemical force: while the other two, on the contrary, are produced by generation, grow by nutrition, and are destroyed by death; are actuated by an internal power, and possessed of parts mutually dependent, and contributory to each others functions.

But while animals and vegetables thus agree in their general characters, they also possess features of distinction which it is never difficult to lay hold of, excepting in the few anomalous cases to which we have already adverted. While both agree in an origin by generation, growth by nutrition, and a termination by death; in an organized structure, and an internal living principle, they differ in the power with which the living principle is endowed, and the effects it is capable of exciting. In the plant it is limited, so far as we are capable of tracing it, to the properties of mere irritability and contractility: in the animal it superadds to these properties those of muscularity, sensation, and voluntary motion.

Animals differ from animals in the greater or less perfection with which the faculties connected with sensation are allotted to them. Man differs from, and is raised above the whole, by the possession of a rational and immortal spirit.

The various classifications under which these departments are usually considered, are best discussed under the separate articles of the departments themselves. We have therefore already noticed plants under Botany, and fossils under Mineralogy, and shall reserve the classification of animals for Zoology: while the present article may be regarded as a general introduction to the whole.

Natural horizon, is the sensible or physical horizon.

Natural magic, is that which only makes use of natural causes; such as the Treatise of J. Bapt. Porta, Magia Naturalia.

Natural philosophy, otherwise called physics, is that science which considers the powers of nature, the properties of natural bodies, and their actions upon one another. See Philosophy, Physics, Newtonian, Electricity, Magnetism, &c.

Na'tural. *s.* (from *nature.*) 1. An idiot; a fool (*Shakspeare. Locke*). 2. Native; original inhabitant (*Raleigh*). 3. Gift of nature; quality (*Wotton*).

Natural, in music. See Music.

NA'TURALIST. *s.* (from *natural.*) A student in physics, or natural philosophy (*Addison*).

NATURALIZA'TION. *s.* (from *naturalize.*) The act of investing aliens with the privileges of native subjects (*Bacon*). Hereby an alien is put in the same state as if he had been born in the king's ligeance, except only, that he is incapable of being a member of the privy council, or parliament, and of holding any office or grant. No bill for a naturalization can be received in either house of parliament without such disabling clause in it; nor without a clause disabling the person from obtaining any immunity in trade thereby in any foreign country, unless he shall have resided in Britain seven years next after the commencement of the session in which he is naturalized. Neither can any person be naturalized, or restored in blood, unless he have received the sacrament within one month before the bringing in of the bill, and unless he also take the oaths of allegiance and supremacy in the presence of the parliament. See Alien.

To NA'TURALIZE. *v. a.* (from *natural.*) 1. To invest with the privileges of native subjects (*Davies*). 2. To make easy like things natural (*South.*).

NA'TURALLY. *ad.* (from *natural.*) 1. According to unassisted nature (*Law*). 2. Without affectation (*Shakspeare*). 3. Spontaneously: without art.

NA'TURALNESS. *s.* (from *natural.*) 1. The state of being given or produced by nature (*South.*). 2. Conformity to truth and reality; not affectation (*Dryden*).

NA'TURE. *s.* (*natura*, Latin.) 1. An imaginary being supposed to preside over the material and animal world (*Cowley*). 2. The native state or properties of any thing, by which it is discriminated from others (*Hale*). 3. The constitution of an animated body (*Shakspeare*). 4. Disposition of mind; temper (*Shakspeare*). 5. The regular course of things (*Shakspeare*). 6. The compass of natural existence (*Glanv.*). 7. The constitution and appearance of things (*Reynolds*). 8. Natural affection, or reverence (*Pope*). 9. The state or operation of the material world (*Pope*). 10. Sort; species (*Dryden*). 11. Sentiments or images adapted to nature, or conformable to truth and reality (*Addison*). 12. Physics (*Pope*).

Thus again, according to Mr. Boyle, nature has eight different significations; it being

used, 1. For the author of nature, whom the schoolmen call Natura Naturans, being the same with God. 2. By the nature of a thing we sometimes mean its essence; that is, the attributes which make it what it is, whether the thing be corporeal or not; as when we attempt to define the nature of a fluid, of a triangle, &c. 3. Sometimes we confound that which a man has by nature with what accrues to him by birth; as when we say, that such a man is noble by nature. 4. Sometimes we take nature for an internal principle of motion; as when we say, that a stone by nature falls to the earth. 5. Sometimes we understand, by nature, the established course of things. 6. Sometimes we take nature for an aggregate of powers belonging to a body, especially a living one; in which sense physicians say, that nature is strong, weak or spent; or that, in such or such diseases, nature left to herself will perform the cure. 7. Sometimes we use the term nature for the universe, or whole system of the corporeal works of God; as when it is said of a phœnix, or chimera, that there is no such thing in nature. 8. Sometimes too, and that most commonly, we express by the word nature a kind of semi-deity, or other strange kind of being.

If, says the same philosopher, I were to propose a notion of nature, less ambiguous than those already mentioned, and with regard to which many axioms relating to that word may be conveniently understood, I should first distinguish between the universal and the particular nature of things. Universal nature I would define to be the aggregate of the bodies that make up the world in its present state, considered as a principle; by virtue whereof they act and suffer, according to the laws of motion prescribed by the Author of all things. And this makes way for the other subordinate notion; since the particular nature of an individual consists in the general nature applied to a distinct portion of the universe; or, which is the same thing, it is a particular assemblage of the mechanical properties of matter, as figure, motion, &c.

> "Nature is but a name for an effect
> Whose cause is God." COWPER.

Nearly conformable with this sentiment of the poet is the language of M. Haüy, who says, "This word, nature, which we so frequently employ, must only be regarded as an abridged manner of expressing sometimes the results of the laws to which the Supreme Being has subjected the universe; at others, the collection of beings which have sprung from his hands. Nature, contemplated thus under its true aspect, is no longer a subject of cold and barren speculation with respect to morals: the study of its productions, or of its phenomena, is no longer bounded to enlightening the mind; it affects the heart, by kindling therein sentiments of reverence and admiration at the sight of so many wonders, bearing such visible characters of an infinite power and wisdom. Such was the disposition that was cultivated by the great Newton; when, after having considered the mutual connection which subsists between effects and their causes, which makes all the particulars concur to the harmony of the whole, he elevated his mind to the idea of a Creator and Prime Mover of matter, and enquired of himself why nature had made nothing in vain? whence it happens that the sun, and the planetary bodies, gravitate the one towards the other, without any intermediate dense matter? and, how it could be possible that the eye should be constructed without the knowledge of optics, or the organ of hearing without the intelligence of sounds? See the Introduction to Haüy's Natural Philosophy, translated by Gregory.

NATURE (Laws of), are certain axioms, or general rules, of motion and rest, observed by natural bodies in their actions upon one another. Of these laws, sir I. Newton has established three. See AXIOMS.

NATU'RITY. *s.* (from *nature.*) The state of being produced by nature: not used (*Brown*).

NA'VAL. *a.* (*naval*, Fr. *navalis*, Latin.) 1. Consisting of ships (*Waller*). 2. Belonging to ships (*Temple*).

NAVAL ARCHITECTURE. See SHIP-BUILDING.

NAVAL CAMP, in antiquity, a fortification, consisting of a ditch and parapet on the land side, or a wall built in the form of a semicircle, and extended from one point of the sea to another. This was sometimes defended with towers, and beautified with gates, through which they issued forth to attack their enemies. Homer hath left us a remarkable description of the Grecian fortifications of this sort, in the Trojan war, beginning at v. 436. Iliad η.

> Then, to secure the camp and naval powers,
> They rais'd embattled walls with lofty tow'rs:
> From space to space were ample gates around,
> For passing chariots; and a trench profound,
> Of large extent; and deep in earth below
> Strong piles infix'd stood adverse to the foe.
> POPE's Transl.

NAVAL CROWN, among the ancient Romans, a crown adorned with figures of prows of ships, conferred on persons who in sea engagements first boarded the enemy's vessel. See CROWN.

NAVAL STORES, comprehended all those particulars made use of, not only in the royal navy, but in every other kind of navigation; as timber and iron for shipping, pitch, tar, hemp, cordage, sail-cloth, gunpowder, ordnance, and fire-arms of every sort, ship-chandlery wares, &c.

NAVAL TACTICS, the military operations of fleets. See TACTICS (Naval).

NAVAN, a borough, post, and fair town of Ireland, in the county of Meath and province of Leinster; situated about 23 miles north-west of Dublin, on the river Boyne. It consists of two chief streets, which intersect each other at right angles. The Tholsel, or

town-house, is a handsome stone building. This place was formerly in great repute, and walled by Hugh de Lacy. An abbey for regular canons, dedicated to the Virgin Mary, was erected here; but whether antecedent to the end of the 12th century is not certain.

NAVARINO, a strong and populous town of the Morea, with an excellent large harbour, defended by two forts. It is seated on a hill, near the sea, eight miles N.E. of Modon, and 17 N.W. of Coron. Lon. 21. 40 E. Lat. 37. 2 N.

NAVARRE, a kingdom of Europe, lying between France and Spain, and divided into the Upper and Lower. The Upper belongs to Spain, and is 75 miles in length and 60 in breadth. The air is more mild, temperate, and wholesome than in the neighbouring provinces of Spain; and, though a mountainous country, it is fertile, abounding in all sorts of game, and in iron mines. It is divided into five districts, whose capital towns are Pampeluna, Estella, Tudela, Olita, and St. Guesa. Lower Navarre belongs to France, and is now the department of the Lower Pyrenees. It is separated from Spanish Navarre by the Pyrenees, and is a mountainous, barren country, 20 miles in length and 12 in breadth. From this country the late king of France took his other title of king of Navarre. See PALAIS, St.

NAVARRE (Peter), a warrior in the 16th century, born in Biscay. After being a seaman, he entered into the service of cardinal Aragon as valet, and next served in the army of the Florentines, and then engaged in the sea service. He was employed by Gonsalvo de Cordova in the Neapolitan wars, as captain, and he contributed much to the taking of Naples. The emperor gave him the domains of Alveto, in Naples, from which he assumed the name of Navarre. He afterwards sailed against the Moors of Africa, and took possession of Oran, Tripoli, and other places; but part of his army was defeated by the Moorish cavalry. His campaigns in Italy afterwards were unfortunate, and he was taken at the battle of Ravenna, 1512. The ill treatment of the Spanish king determined him to enter into the service of Francis I. In his attempt to relieve Genoa he was taken by the imperial troops, and for three years languished in the dungeons of Œuf, till the treaty of Madrid set him free. He was taken prisoner at the retreat of Aversa, and again sent to the dungeons of Œuf. Here his life was spared by the duke of Orange, in compassion for his misfortunes and his valour. He died soon after; though some assert that he was strangled in his bed.

NAUCORIS, in the entomological system of Fabricius, a tribe of the genus NEPA, which see.

NAUCRATIS, a city of Egypt, on the left side of the Canopic mouth of the Nile, celebrated for its commerce. No ship was permitted to land at any other place, but was obliged to sail directly to the city, there to deposit its cargo.

NAUDE (Gabriel), was descended from a good family, and born at Paris, February 12, 1600. His parents observing his fondness for reading and inclination to letters, resolved to breed him in that way; and accordingly sent him to a religious community, to learn the first rudiments of grammar and the principles of christianity. Thence he was removed to the university, where he applied himself with great success to classical learning; and having learned philosophy, was created master of arts very young. As soon as he had finished his course in philosophy, he remained some time at a stand what profession to choose, being advised by his friends to divinity; but his inclination being more turned to physic, he fixed at length upon that faculty. However, this choice did not prevent him from indulging his genius in other branches of learning: in reality, the plan of his studies was very extensive, suited to his comprehensive talents and indefatigable industry: and he soon distinguished himself therein so much, that Henry de Mesmes, president à mortier, hearing his character, made him keeper of his library, and took him into his family. Naude was the more pleased with this post, as it gave him an opportunity of gratifying his bookish taste in general, and at the same time furnished him both with means and leisure to improve himself as he could wish, in the science which he had embraced in particular. He quitted it in 1626, in order to go to Padua to perfect himself therein: but he did not continue long in that university, the death of his father and his domestic affairs calling him back to Paris before the expiration of the year.

In 1628 the faculty of physic appointed him to make the customary discourse on the reception of licentiates; which performance entirely answered their expectations from him, and was made public. In 1631, cardinal Bagni made him his librarian and Latin secretary, and carried him with him to Rome in the spring of that year. Naude continued in this service till the death of the cardinal, which happened July 24, 1641; and in the interim made an excursion to Padua, to take his doctor of physic's degree, in order to support with a better grace the quality with which he had been honoured by Louis XIII. who had made him his physician. The ceremony of this appointment was performed March 25, 1633, and we have the speech he pronounced on the occasion. After the death of his patron he had thoughts of returning to France; but was detained in Italy by several advantageous offers made to him by persons of consideration in that country. Among these he preferred those of cardinal Barberini, and closed with his eminence. However, as soon as cardinal Richelieu sent for him to be his librarian, he immediately returned to Paris; but he happened not to be long in the service of the prime minister, if it be true that he arrived at Paris

in March 1642, since cardinal Richelieu died in December following: notwithstanding, he succeeded to the like post under Mazarine, for whom he formed a most rich library, which he raised from the first volume in the space of seven years to the number of 40,000. Christiana, queen of Sweden, who set herself to draw into her dominions all the literati of Europe, procured a proposal to be made to Naude of being her library keeper; and as he was then out of all employ, he accepted the proposal, and went to Cop. But he soon grew out of humour with his residence in Sweden: the manners of the people, so very different from his, gave him great disgust; and seeing France become more quiet than it had been, he resolved to return. Accordingly he quitted Sweden loaded with presents from the queen, and several persons of distinction: but the fatigue of the journey threw him into a fever, which obliged him to stop at Abbeville; and he died there July 29, 1653.

As to his character, he was very prudent and regular in his conduct, sober, never drinking any thing but water. Study was his principal occupation, and he was indeed a true *Helluo librorum*; so that he understood them perfectly well. He spoke his mind with great freedom, and that freedom sometimes showed itself upon religious subjects, in such a manner as might have occasioned some disadvantageous thoughts of him; but the christian sentiments in which he died led some to believe that his heart never was corrupted, and had no share in the free expressions which sometimes escaped from him; especially in the philosophical railleries which passed sometimes between him, Guy Patin, and Gassendi. He wrote a great number of books, a catalogue of which may be seen in Niceron's Memoirs, tom. ix. Voltaire says, that "of all his books, the Apologie des grands Hommes accusés de Magie is almost the only one which continues to be read."

NAUDE (Philip), well known as an able professor of mathematics at Berlin in the seventeenth and early part of the eighteenth century, was born at Metz in Lorrain, in the year 1654. At the age of about twelve he was taken into the service of the court of Eysenach, in the capacity of page, and attendant on the young princes. In this situation his behaviour secured him the esteem of all who knew him; and while he continued here he learned the German language, which afterwards proved of great use to him. When he had spent about four years at Eysenach, his father chose to take him home; but how he was employed during the next fifteen years of his life we are not informed. We are only told that his father had neither the intention nor the means of affording him a learned education; but that, notwithstanding the disadvantages of his condition, having an unconquerable thirst for knowledge, he became his own master, and made considerable proficiency in different branches of learning, particularly in the mathematical sciences. As he was in principle a protestant, when the edict of Nantes was revoked in 1685, he left France with his wife and young child, about nine months old, and resided about two years at Hanau. Hence he removed to Berlin, where he contracted an intimacy with M. Langerheld, mathematician to the court, and tutor to the pages. This gentleman, who knew how conversant he was with the sciences, advised him to open a mathematical school, and recommended pupils to him. In 1687 he received an appointment to teach arithmetic and the elements of the mathematics at the college of Joachim; and in 1690 he was made secretary interpreter. Upon the death of M. Langerheld not many years afterwards, M. Naude succeeded him in 1696, both in his employments at court, and the professorship in the Academy in Sciences. In 1701 he was elected a member of the Academy of Sciences; and in 1704, when the king founded the Academy of Princes, M. Naude was attached to it by a special patent, as professor of mathematics. He died at Berlin in 1729, at the age of seventy-five, highly respected for his integrity and general excellence of character. Though the mathematics chiefly occupied his attention, he was not unacquainted with the other sciences, and as he was zealous for the religion which he professed, he had made divinity his particular study, and written several treatises on religious and moral subjects. In mathematics, his sole publication was Elements of Geometry in quarto, written in German, and printed at Berlin for the use of the Academy of Princes; and some smaller pieces, which appeared at different periods in the Miscellanea Berolinensia. Among his theological and moral productions were, Sacred Meditations, 1690, 12mo.; Evangelical Morality, 1699, in two volumes, 12mo.; The Sovereign Perfection of God in his Divine Attributes, and the perfect Integrity of the Scriptures, in the Sense maintained by the first Reformers, 1708, in two volumes, 12mo. written against M. Bayle; which, being attacked in a 12mo. pamphlet, he defended in A Collection of Objections to the Treatise on the Sovereign Perfection of God, with Answers to the same, 1709, 12mo.; An Examination of two Treatises of M. de Placette, 1713, in two volumes, 12mo.; Dialogue in Solitude, partly translated from the Dutch of William Teelink, 1717, 12mo.; A Refutation of the Philosophical Commentary, 1718, 12mo. &c. (*British Encyclo.*)

NAVE. *s.* (nap, Saxon.) 1. The middle part of the wheel in which the axle moves (*Shakspeare*). 2. (from *navis*, *nave*, old French.) The middle part of the church distinct from the aisles or wings (*Ayliffe*).

NAVEL, in anatomy, the centre of the lower part of the abdomen; being that part where the umbilical vessels passed out of the placenta of the mother. See ANATOMY and MIDWIFERY.

NAVEL-GALL. In farriery, an injury sus-

tained upon the centrical part of the back-bone, corresponding with the part below, whence the name. It is always occasioned by the pad of the saddle being in itself too wide (and deficient in stuffing,) letting the iron-work of the treec ome into contact with the spine; or from a long and constant use of a roller in the stable, till having lost the elasticity of its stuffing, it then becomes sufficiently hard, particularly with too tight buckling, to occasion the injury, which is often productive of much trouble and vexation.

NAVELWORT (Venus's), in botany. See COTYLEDON and CYNOGLOSSUM.

NAVEW, in botany. See BRASSICA.

NAUGHT. *a.* (nahτ, naphihτ, Saxon.) Bad; corrupt; worthless (*Hooker*).

NAUGHT. *s.* Nothing. This is commonly, though improperly, written *nought* (*Shak.*).

NA'UGHTILY. *ad.* (from *naughty*.) Wickedly; corruptly.

NA'UGHTINESS. *s.* (from *naughty*.) Wickedness; badness (*Sidney*).

NA'UGHTY. *a.* (from *naught*.) Bad; wicked; corrupt (*Sidney*).

NAUGUER, in mastiology. See ANTELOPE.

NAVICULAR VALVE. *s.* In botany. Cymbiformis valvula. A boat-shaped valve. As in isatis and thlaspi.

NAVICULARE OS. (*navicularis*, from *navicula*, a little boat). *Os scaphoides.* A bone of the carpus and tarsus is so called from its supposed resemblance to a boat. See CARPUS and TARSUS.

NAVIER (Peter Toussaint), of St. Dizier, died at Chalons-sur-Marne, 1779. He is known for his discovery of nitrous ether, and the combination of mercury with iron, hitherto regarded as impossibilities. In epidemical disorders his prescriptions were very successful; and to the truest meekness and modesty he united the highest humanity. He wrote a dissertation on common diseases—observations on the softening of the bones—reflections on the danger of hasty burials, and the abuses of interments in churches—antidotes against arsenic, 2 vols. 12mo. &c.

NA'VIGABLE. *a.* (*navigable*, French.) Capable of being passed by ships or boats (*Raleigh*).

NA'VIGABLENESS. *s.* (from *navigable*.) Capacity to be passed in vessels.

To NA'VIGATE. *v. n.* (*navigo*, Lat. *naviger*, Fr.) To sail; to pass by water (*Arbuth.*).

To NA'VIGATE. *v. a.* To pass by ships or boats (*Arbuthnot*).

NAVIGATION (*navigatio*), from *navigo*, compounded of *navis*, a ship, and *ago*, to govern or manage), the art of conducting a ship from one port to another; and comprizes the method of giving to the vessel the desired direction by means of the sails and rudder, or seamanship; as well as the mode of ascertaining the relative situation of the ship at any assigned time and the future course, so as to reach her place of destination with safety and expedition. To the latter department, however, in compliance with custom, our present researches must be limited.

The antiquity and utility of navigation are acknowledged by all; and the art was probably cultivated by several cotemporary tribes, inhabiting the sea coast, unknown to one another; if so, the circumstance accounts for different authors ascribing the invention to different persons and nations. We may however now despair of ascertaining how

> "From darkest times her humble birth she drew."

It is generally admitted that the Phœnicians were the first people who applied themselves assiduously to the cultivation of navigation, and had they not been so extremely tenacious of the knowledge they acquired, their success might not only have been highly beneficial to the neighbouring nations, but the civilized world would have been gratified by it, and in return would have done ample justice to their genius and enterprize. However, their great arcanum, matured by the perseverance of ages, would have been lost when Alexander subdued Tyre and Sidon, on account of the illiberal jealousy with which it was concealed from the rest of the world, had not their Carthaginian descendants preserved it in a distant corner of Africa.

Alexandria, intended by its founder, not only to perpetuate his name, but likewise to be the grand emporium of the eastern and the western commerce, next "flickers through the gloom:" and in consequence of the exertions of the Alexandrians to accomplish this ample intention, navigation began to dawn in Egypt. Yet the Carthaginians, who inherited the Phœnician propensity to cultivate the art, eclipsed the Egyptians as well as the Grecians in nautical knowledge and experience, and by degrees acquired those vast resources which enabled them so long to withstand the Roman power. During the obstinate struggle between Carthage and Rome, the first germs of the art appeared in Italy.

The destruction of Carthage, and battle of Actium, consigned navigation and commerce to the Romans: when the latter was left to the exertions of subject provinces, and the former was only cultivated to aid their favourite views of universal dominion: and upon the ruin of that empire navigation shared the fate of literature and the other arts.

When the barbarian Attila destroyed Aquilea, Mantua, Treviso, Verona, and other adjacent cities, such of the inhabitants as escaped the slaughter fled to the islands of their coast, where they took up their residence, and founded Venice. Here navigation and commerce revived from the general wreck, and passed successively to the Genoese, Hans Towns, Portuguese, Spaniards, English, and Dutch.

Still navigation was very imperfect, although the improvements made in the sails and rigging had superseded the rowers; and the mariner's compass, invented about 1260, had encouraged the navigator to launch boldly into the watery expanse: yet geometry, trigonometry, and astronomy, which constitute the ground-work of the method whereby the mariner discovers his situation, were not sufficiently matured to be subservient to his purpose: but, about this period, while he was traversing the pathless ocean, or exploring unknown shores, the student was no less assiduous to enrich the haven-finding art with his researches: and the application of the mathematical sciences, with the invention of suitable and accurate instruments, soon enabled the navigator

to determine his situation with tolerable precision.

Perhaps the progress of navigation has not been equal to that of the other arts, which may be owing to the seaman's confidence in the methods sanctioned by those he reverences, accompanied by an inability to comprehend how a landman should improve his art: be this as it may, the comparative perfection to which navigation is arrived, is more particularly attributable to the genius and labours of Mr. Edward Wright, Mr. James Gregory, and Dr. Edmund Halley, who perfected Mercator's chart, and pointed out true methods of computing the longitude from the dead reckoning; John Napier, baron of Merchiston, and Mr. Henry Briggs, who invented and perfected the logarithms; James Hadley, esq. who published the quadrant that bears his name, and the rev. Dr. Maskelyne, under the commissioners of longitude, who devised and established the nautical almanac.

The authors who have written upon navigation are numerous, both in England and upon the continent; yet if we except an ingenious treatise upon the longitude by Dr. Andrew Mackay, and the valuable tables for navigation and nautical astronomy, by Joseph de Mendoza Rios, esq. every thing of any moment in the various volumes may be found in Mr. John Robertson's excellent treatise. These, with the Nautical Almanac, Requisite Tables, and British Mariner's Guide, by Dr. Maskelyne, may be considered a complete library for a navigator.

Having taken a cursory retrospect of the slow and now obscure steps by which navigation attained its present modification, we proceed to develope the principles upon which the navigator founds the computations which ascertain the ship's relative position; and, at the same time, from those principles to deduce the modes of calculation.

1. When a ship begins a voyage, the first thing which presents itself to the computist is to ascertain the distance, or space passed over in some determinate time, for which purpose half a minute is usually assumed for the unit of time, and a proportionate segment of a meridian for the unit of space, which last dimension is called a knot. The mutual relation being so adjusted, that for every knot of the log-line which is run out in half a minute, so many miles does the ship sail in an hour, admitting her velocity continues uniform for that space of time; but this, together with currents and heave of the sea, the judicious navigator will take into consideration.

Comparing the results of various mensurations, the length of a degree in these latitudes appears to be about 365244 feet, see Phil. Transa. for 1795, p. 491; therefore a nautical mile is $= \frac{365244}{60}$ $= 6087{\cdot}4$ feet, and consequently the space corresponding to half a minute in time $= \frac{6087.4}{60 \times 2}$ $= 50{\cdot}725$ feet, or 50 feet $8\frac{3}{4}$ inches nearly, which ought to be the length of a knot, could the distance sailed be accurately measured: but the drift of the log, with the surface of the water in the direction of the wind; the weight of the line, and the friction of the reel, all tend to render the distance, as given by the log, less than it ought to be: for this reason, and likewise because it is safest to have the reckoning a-head of the ship, competent judges divide their line into knots of 48 feet, and allow half a second for turning the glass after the stray line is out, or, which amounts to the same thing, use glasses which run out in $29\frac{1}{2}''$. In short, the result of this fundamental operation is very uncertain, and a method free from the respective defects of such as have been proposed, is a desideratum in navigation.

Cotton lines have been recommended, and particularly adopted, as being less liable to vary in length; but the extension of hempen lines by draught, and contraction by moisture, is much too considerable to be neglected by the navigator; besides which, the temperature of the atmosphere may affect the glass to about one-sixth of the whole time of running out. It is therefore highly requisite to examine both line and glass, from time to time, and if either or both be found erroneous, the true distance may notwithstanding be obtained.

For, putting $G = 30''$, $g =$ the time measured by the erroneous glass, $K = 48$ feet, $k =$ the length of an inaccurate knot, and $D =$ the computed distance the ship has sailed during the time the error is admitted to have existed. Then,

(1) When the glass is found inaccurate, and the line correct.

Because the excess or defect of D will be directly as g, it will be as $g : D :: G : \frac{DG}{g} = \frac{30D}{g}$, the true distance.

Ex. The distance run by the log is 80 miles, and the glass is found to run out in 24''. Required the true distance?

Here $\frac{30 \times 80}{24} = 5 \times 20 = 100$ miles, the true distance.

(2) When the line is inaccurate and the glass correct.

The error in the distance will be reciprocally as the excess or defect of the line, therefore $K : k :: D : \frac{kD}{K} = \frac{kD}{48}$ the true distance.

Ex. The distance run is 150 miles, and the length of the knot 45 feet. Required the true distance?

Here $\frac{45 \times 150}{48} = 140{\cdot}625$ miles, the true distance.

(3) When both the glass and line are found to be inaccurate.

By compounding the foregoing analogies $g : D :: G : \frac{DG}{g} =$ the distance corrected for error in glass, and $K : k : \frac{DG}{g} : \frac{DGk}{gK} = \frac{30Dk}{48g} = \frac{5Dk}{8g}$ or $\frac{10Dk}{16g}$, the true distance.

Ex. The distance sailed by the log is 200 miles, the glass runs 33'', and the knot measures 42 feet. Required the true distance?

Here $\frac{5 \times 200 \times 42}{8 \times 33} = 159.09$ miles, the true distance.

2. The course a ship steers is ascertained by the mariner's compass (see COMPASS). But as the magnetic north seldom coincides with the true, in order therefore to determine the angle which the ship actually makes with the meridian, it is requisite that the deviation or variation of the points of the compass from the corresponding points of the horizon should be known.

To illustrate the methods of solving this important problem, let Fig. 1. Pl. 114. be a stereographic projection of the sphere on the plane of the horizon, the north, east, south, and west points of which are represented by N.E. S.W. respectively, Z being the observer's zenith, P the elevated pole, Σσς a parallel of declination, Σ the true place of the sun at rising, and Σ′ his place as pointed out by the compass at the same moment.

Then is EΣ the true amplitude, EΣ′ the magnetic amplitude, and ΣΣ′, their difference, the variation. Now, in order to determine EΣ, and finally ΣΣ′ from the latitude of the ship, and the declination of the sun, which are the customary data: in the quadrantal spheric triangle PEΣ, PΣ = the sun's polar distance, and the angle PEΣ = the latitude are given. As it would be extraneous to investigate formula, which decidedly belong to another department of science, we therefore refer to any of the numerous treatises on the theory of trigonometry, where it will be found demonstrated that cosine PEΣ : cosine PΣ : : radius : sine EΣ the amplitude, or cosine ΣN the azimuth; hence 10 + logar. cos. PΣ + comp log. cos. PEΣ = log. sine ΣE : But the log. secant — 10 = the complement of the logarithmic cosine, therefore log. cos. PΣ + log. sec. PEΣ = log. sine EΣ.

That is, The logarithmic sine of the true amplitude is equal to the sum of the logarithmic sine of the declination and logarithmic secant of the latitude.

Example. July 24th, 1810, in latitude 50° N. longitude 35° W about a quarter after four o'clock A.M. the sun was observed to rise E.N.E., allowance being made for semi-diameter. Required the variation?

Sun's declination July 24th, at noon	19° 59′			
Equation to 7¼ hours from noon +	4 4			
to 35° W. - - - -	1 3			
Reduced declination - - - -	20° 2		Sine - - -	9·5347452
Latitude - - - - -	50		Secant 10 - -	·1919325
True amplitude EΣ - -	E. 32	12¼ N.	Sine - - -	9 7266777
Magnetic amplitude EΣ′ -	E. 22	30 N.		
Variation - - - - -	9	42½		

West, because the magnetic place of the sun is more distant from the north than the true, the observation being made in the eastern hemisphere.

Were greater accuracy required, the horizontal refraction, parallax, height of the eye, and latitude of the ship, ought to be taken into account, which would render the triangle oblique: therefore to obviate their effects, let the amplitude be observed when the altitude of the sun's lower limb is = 15′ + the dip of the horizon. For instance, if the height of the eye be 20 feet, the amplitude ought to be observed when the altitude of the sun's lower limb is 19½ minutes.

When clouds or haze render this mode of solution impracticable, the mariner obtains the magnetic azimuth SZς by observation, as before, and deduces the true azimuth SZσ from the latitude, sun's altitude, and declination: having in the spheric triangle σPZ, PZ = the complement of the latitude, and σZ, σP the sun's zenith and polar distances respectively, to find the azimuth or angle SZσ; the logarithmic sine of the half of which is (by trigonometry) = ½ (log. sine ½ (Pσ + D) + log. sine ½ (Pσ — D) + log. secant PZ + log. secant Zσ — twice the radius). D being = Zσ — ZP.

Ex. July 25th, 1810, in latitude 31° 30′ N. longitude 34° 10° E. a little after 7 o'clock A.M. the altitude of the sun's lower limb was 23° 20′, and bearing per compass E. 5° 20 S. height of the eye 21 feet. Required the variation?

Sun's declination July 25th, at noon	19° 47′ N.	Observed altitude of the sun's L.L. -	23° 20′
Equation to 5 hours - -	-- 2½	Semidiameter - - - -	+ 16
to 25° 20′ E. - -	+ 1	Dip and refraction - - -	— 6½
Reduced declination - -	19 45½	True altitude - - -	23 29½
Polar distance - - -	70 14½	Zenith distance - -	66 30½

Co-latitude - - -	PZ	58″ 30	cosecant—radius	,0692342
Zenith distance - -	Zσ	66 30½	cosecant—radius	,0375748
D - - - - - -		8 0½		9·8060232
Polar distance - - -	Pσ	70 14½		9·7133077
Sum - - - -		78 15		2)19·6201449
Difference - - - - -		62 14		98100724
½ (Pσ + D) - - - - -		39 7½	sine	
½ (Pσ — D) - - - -		31 7	sine	
		40° 13′ 22″	sine	
		2		
True azimuth from south - -	S.	80 26 44 E.		
Observed azimuth - -	S.	84 40 0 E.		
Variation - - -		4 13 10		

East, because the sun's true place is to the right hand of the observed.

Many other methods of obtaining the variation might be adduced, but these two are accurate, easy, and sanctioned by custom; and we would not draw the attention of navigators to inventions which have little to recommend them but their novelty.

3. Having developed the methods of estimating the course and distance, we shall now assume these as data, and proceed to investigate the mode of obtaining from them the relative position of the ship.

But before the line described by a ship, upon the surface of the ocean, with its concomitant incidents can be subjected to calculation, its nature and properties must be known: to form a correct idea of which, conceive

(1.) First, that the port B bears due north or south from A; if therefore the line which joins those points be produced, it will pass through the poles of the world, and consequently the ship which sails in a direct line from A to B, or *vice versa*, describes part of a meridian.

2. If B bears due east, or west from A, and they are equi-distant from the poles of the world, they are consequently upon the equator: but if the polar distances of the parallel on which they are situate be unequal, the line joining them is parallel to the equator or a parallel of latitude, and therefore perpendicular to the meridians: hence, the ship which sails due east or west will intersect the meridians at right angles, and either describe a portion of the equator, or of a circle parallel to it.

(3.) If the line joining A and B neither coincide with a meridian nor cut it at right angles:—for instance, if A be the Lizard, and B the island of Barbadoes, which bear S.W. and N.E. from one another: a ship which sails in a direct course from the former to the latter will not only steer S.W. when she begins her voyage, but likewise continue S.W. or cut every meridian at an angle of 45° during her progress: consequently, while the course continues invariable, the ship makes equal angles with all the meridians she meets on the surface of the ocean:—and because her track is described upon a spherical surface, it is not a straight line: nor is it a circle; for an oblique circle described upon the surface, of the earth makes unequal angles with all the meridians. (See PROJECTION OF THE SPHERE): it is therefore requisite,

4. (1). To investigate the nature and properties of the line, described upon the surface of the earth, which cuts all the meridians at equal angles.

Let PQW (Fig. 2. Pl. 114.) represent part of a stereographic projection of the sphere on the plane of the equator, and let the curve QAFOP intersect the equidistant meridians PR, PS, PT, PV, PW, making the angle PEF = PCF = PHY = PAF = PQF. Then, because in every stereographic projection the lines intersecting each other form angles, equal to the angles upon the sphere which they represent; the curve QAFP is the representation of the track of a ship which cuts all the meridians in the angle PQF.

Now, in the equiangular, and consequently similar, triangles, PAQ, PHA, &c. to PFE, it will be PQ : PA : : PA : PH : : PH : PC : : PC : PE : : PE : PF; hence PQ, PA, &c. to PF are in geometrical proportion, while the corresponding arcs QR, RS, &c. to V ware (by hypothesis) in arithmetical proportion: therefore, the latter are the logarithms of the former; that is, QR is the logarithm of the ratio of AP to QP, OW the logarithm of the ratio of PF to PQ, and so on: consequently, the curve QAFP is the logarithmic spiral or nautical rhumb-line.

5. Let PG be perpendicular to PA, and through the point A at which the curve intersects PR draw AG, making the ∠ PAG equal to that which the rhumb-line makes with the meridians: then will the line AG coincide with an indefinitely small part of the curve at A, and consequently be a tangent to it at that point.

Admit that the meridians PR, PS, &c. to PW, are indefinitely near to each other; and from the points H, C, E, F, upon PA, PH, PC, PE, demit the perpendiculars He, cf, Eg, Fh: then, by similar triangles, Ae : AH : : Hf : HC : : cg : CE, &c. : : (12 E . V), Ae + Hf + cg + &c. (= AP) : AH + HC + CE + &c. (= the curve AFOP) : : AP : AG; whence by equality, the infinite rhumb AFOP is equal to the finite right line AG.

Let FL be a tangent at the point F, and meet PL drawn perpendicular to PF in L; then, it may be shewn in the same manner, that the rhumb FOP is equal to the right line FL.

6. Now the right-angled triangles APG, FPL, having the angle PAG in the one equal to PFL in the other, are similar, therefore PA : PF : : AG (AOP) : FL (FOP), or by division, PA : PA − PF (AN) : : AG : AG − FL (AOP − FOP = AF), and alternately PA : AG (: : cos. of angle PAG : radius) : : AN : AF.

But AN is equal to the difference of the latitudes of the points A and F, AF the length of the rhumb intercepted between those points or distance and the angle PAG, which the rhumb makes with the meridians, is the course:

Hence radius : cosine of the course : : the distance : difference of latitude.

Therefore, if a right-angled triangle ANF (Fig. 3.) be constructed, in which the hypothenuse AF is equal to the distance run; the angle at A equal to that which the rhumb makes with the meridians, or course, and the perpendicular AN equal to the difference of the latitudes left and come to: any two of these being given, the third may be accurately determined by the above specified analogy; and that whether the earth be a sphere, spheroid, or any other regular solid formed by revolving about its axis: but the third side FN or departure remains to be considered.

This is called plane sailing, from the common supposition of its being performed upon a plane: and the six cases of a plane right-angled triangle constitute all the varieties it admits of. See Dr. Hutton's Mathematical and Philosophical Dictionary, under SAILING.

When the course, distance, and latitude left are given, the parallel of latitude the ship is upon at any assigned time may be found by plane sailing: but as it is likewise requisite for the mariner to know upon what meridian he is at the same time, because the intersection of those circles determines his situation; and as plane sailing makes no provision for this purpose, we must necessarily prosecute our inquiries.

If the ship sail upon a parallel of latitude, AB (Fig. 2.), this is, due east or west:—let P (Fig. 4.) be the pole; HBD a section parallel to the equator QWLC; PR, PW meridians intercepting AB a segment of a parallel of latitude. Then CR, CW, and DA, DB being drawn, the points CWR, DBA being respectively in the same planes, and

those planes parallel to one another, the lines WR, WC, CR and AB, BD, DA are therefore respectively parallel, and the angles WCR, BDA consequently equal: hence, by similar sectors,

AD, the cosine of the latitude AR
is to AB, the distance sailed,
as RC, the radius of the equator
to RW the difference of longitude:

Which is the property of a right-angled plane triangle ABC (Fig. 5.), in which the hypothenuse AC represents the difference of longitude, the perpendicular CB the distance, and the angle at C the latitude of the parallel. This, from the manner in which it is performed, is denominated PARALLEL SAILING, and the varieties or cases which it admits of are,

(1.) Cosine of the latitude : distance : : radius : difference of longitude.

(2.) Radius : difference of longitude : : cosine of the latitude : distance.

(3.) Difference of longitude : radius : : distance : cosine of the latitude.

Let ENF be a section parallel to DAB, then CW : WR : : DB : BA : : EF : FN; therefore

(4.) Cos. lat. A : cos. lat. N : : segment AB : segment FN, and

(5.) Segm. AB : segm. FN : : cosine of latitude A : cos. lat. N.

Example. The longitude of the Borlings (near Lisbon) is 9° 37′ W., that of Baltimore 76° 55′ W, and their common latitude is 39° 20′ N. Required their distance?

Longitude of Baltimore	-		76° 55′ W.
Longitude of the Borlings	-		9 37 W.
Difference of longitude	-		67 18 = 4038
Radius	-	s. 90°	- 10 000000
Into cosine of latitude	-	39° 20′	9·88844
As the difference of longitude		4038	3·60617
To the distance 3123½ miles	-		3 49461

7. Suppose the ship sails upon a rhumb towards the pole, or from A to F (Fig. 2.). The sum of all the intermediate parallels He + Cf + Eg + Fh will be the departure; FN the meridional distance, which in this case is less than the departure; and RW the difference of longitude; hence the departure, meridional distance and difference of longitude are all different: if she sail in the opposite direction, or from F to A, the departure and difference of longitude will be the same as before, but the meridional distance is now AB, a quantity greater than the departure: consequently, the departure made in the voyage from A to F or from F to A being the same, and consisting every where of quantities equidifferent, the extremes of which are as AB to FN; the sum of all the departures (provided each of them is indefinitely small) will therefore be a mean between AB . FN; or XY, the corresponding parallel or mean arc of the middle latitude be equal to ½ (AB + FN) which therefore will nearly represent the whole departure of the voyage between A and F.

Hence, by parallel sailing, RW : AB : : Radius : cosine of AR
and RW : FN : : Radius : cosine of NR;

therefore, by equality of ratios and composition, radius : ½ (cos. AR + cos. NR) : : difference of longitude RW : departure XY, or, because the cosine of RX is nearly equal to ½ (cos. AR + cos. NR) we obtain this fundamental theorem, radius : cosine of the middle latitude RX : : difference of longitude : departure.

This is called MIDDLE-LATITUDE SAILING, and the several cases which it admits of are readily solved by connecting the triangles of the plane and parallel sailing, so that the departure may be common to both. (See Fig. 6.).

For, in the triangle FCN, radius : cos. mid. lat. : : diff. long. : departure,
And, in the triangle FNA, radius : tang. course : : diff. lat. : departure;
Therefore by equality (1.) Diff. long. : diff. lat. : : tang. course : cos. mid. lat.
(2.) cos. mid. lat. : tang. course : : diff. lat. : diff. long.
(3.) Tang. course : cos. mid. lat. : : diff. long. : diff. lat.
And because the sides are as the sines of their opposite angles,
(4.) Sine course : cos. mid. lat. : : diff. long. : distance.
(5.) Distance : diff. long. : : cosine mid. lat. : sine course.
(6.) Diff. long. : distance : : sine course : cos. mid. lat.

For an example—Suppose a ship from Oreby-point in latitude 58° 35′ N. and longitude 6° 37′ W. sails N. 67′ easterly, 2649 miles. Required the latitude and longitude come to?

To find the difference of latitude.

Radius	- - -	-	10·0000000
Is to cosine of course	67°	-	9·5918780
As the distance	2649′	-	3·4230820
To the diff. of lat.	1035′	-	3·0149600
Lat. of Oreby-point	58° 35′ N.		58° 35′
Diff. of latitude	17 15 N. half		8 37½
Latitude come to	75 15 N. mid. lat.		67 12½

To find the difference of longitude.

Cosine of mid. lat.	67° 12½	co. log.	0·4116608
Is to sine of course	67°	-	9·9640261
As the distance	2649′	- -	3 4230820
To the diff. of long. 6291½′		-	3.7987689
Longitude of Oreby-point		- -	6° 37 W.
Difference of longitude		- -	104 51½ E.
Longitude come to		- -	97 14½ E.

8. Could the latitude of that parallel whose arc is equal to the departure be conveniently obtained to a tolerable degree of accuracy, and were the arithmetical mean of the cosines of the two distant latitudes equal to the cosine of their arithmetical mean; these researches might end with middle-latitude sailing, and a true chart would complete this department of navigation. Having however seen that the former is not the case, and that the latter is not yet attained, we shall at present reserve our opinion of middle-latitude sailing, and proceed,

9. To inquire in what manner the surface of the earth be delineated upon a plane, so that the relative position of places be preserved, and the necessary nautical computations performed by plane trigonometry.

In Fig. 4. let PQC be a quadrant of the sphere whose radius is CQ; PQ, PW meridians, EK the radius of a lesser circle parallel to the equator LWQ, and QAF a rhumb.

Suppose gkfW a segment of a cylinder formed by perpendiculars erected at every point of the equatorial arc WQ, and admit the spherical qua-

drilateral QKFW projected thereon by rays issuing from C the centre of the sphere.

Now Qk is parallel to wf by hypothesis, and it is obvious that fk, the projection of FK, is a circular arc parallel and equal to WQ:

If therefore the figure $Qkfw$ be extended into a plane, and turned about Qk as an axis until QW coincide with CQ produced, it will be a rectangular parallelogram $Qkf'w'$—and the triangle QFK projected into Qfk, in which kf is equal to QW′.

But KF : QW :: EK (the cosine of the latitude QK) : CQ (the radius of the sphere) : : CK = CQ : Ck (the secant of the latitude.)

Hence, in the projection, FK, the segment of a parallel of latitude is protracted in the proportion of the secant of the latitude to radius, consequently, to obtain similiarity Qk must be increased in the same proportion.

For this purpose, from centre C with radius Ck describe the ark ks, intercepted by QW′, make $Q\varkappa$ equal to the arc ks, let $\varkappa\varphi'$ be drawn parallel to kf' until it meet $w'f'$, produced in φ', and join $Q\varphi'$.

Then by similar segments $QK : sk = Q\varkappa :: CK = CQ : Ck$.

Hence $\varkappa\varphi' = kf' : KF :: kC : KC :: Q\varkappa = sk : QK :: Q\varphi' : QF$, therefore the right-angled triangle $Q\varkappa\varphi'$ on the plane, is proportional to the mixtilineal triangle QKF on the sphere, and consequently the relative position of places on both are identical.

10. Conceive the meridian PR drawn indefinitely near to PW, and a the projection of the point ·, where it cuts the rhumb, through a draw an arc parallel to the equator and to the point i, where it meets $Q\varphi$ draw Ci; let the arc is be described from centre C, and $Q\iota$ made equal to is.

Then, by similar sectors, $Ci : CQ :: CI\ (CQ) : ID :: QR : IA :: \dot{QR}\ (WR)\ \frac{CQ}{Ci} = QR\ (= AB) = \dot{IA}$; and, CQ : tang. AQI :: $\dot{QI}$ (SF) : $\dot{IA} = \frac{CQ}{ci} \times \dot{QR}$; therefore $\dot{QR} = \frac{\text{tang. AQI} \times \dot{QI} \times ci.}{CQ^2}$

But CI : CQ :: is $(Q\iota)$: QI :: $\dot{Q\iota}$: $\dot{QI}$, hence $ci \times \dot{QI} = CQ \times \dot{Q\iota}$, therefore $\dot{QR}$ =

$\frac{\text{tang. AQI} \times \dot{Q\iota}}{CQ}$, and consequently QR = $\int \frac{\text{tang. AQI} \times \dot{Q\iota}}{CQ} = \frac{\text{tang. AQI} \times Q\iota}{CQ}$:

Whence CQ : tang. AQI :: $Q\iota$: QR.

And for the same reason CQ : tang. AQI :: $Q\varkappa$: QW.

Hence by equality $Q\varkappa$, : $Q\iota$ :: QW : QR,

And by division and alternation $Q\varkappa$: QW : : (CQ : tang. AQI = FAN : :) $Q\varkappa - Q\iota$ $(= \iota\varkappa = a\gamma')$: QW − QR $(\upsilon\varphi')$; which analogy is applicable to the right-angled plane triangle $a\gamma'\varphi'$, having an angle $\gamma'a\varphi'$ equal to that which the rhumb makes with the meridians or course, the adjacent side $\gamma'a\varphi$ = the protracted or meridional difference, and the opposite side $\gamma'\varphi'$ equal to the difference of longitude. This triangle is therefore similar to a triangle $am\pi$ constructed with the course $ma\pi$, and proper difference of latitude am, agreeably to the property developed in art. 6; and consequently the homologous sides will be proportional.

This ought to be called Wright's sailing, but Mercator's is the only appellation it has hitherto borne, and imperious custom compels us to retain it. The cases or variations it admits of are, first, in the triangle $a\gamma'\varphi'$.

(1) Rad. : tang. course :: meridional diff. lat. : diff. longitude.

(2) Rad. : cotang. course : : diff. long. : merid. diff. latitude.

(3) Merid. diff. lat. : diff. long. :: radius : tangent of the course.

Secondly in the triangle $am\pi$. See art. 6.

(4) Radius : cosine course :: distance : diff. latitude.

(5) Radius : secant of the course : : diff. lat. distance.

(6) Dist. : diff. of lat. : : radius : cosine of the course.

The departure is an unnecessary, and in most cases an improper, datum, but were it admitted we should further have

(7) Proper diff. lat. : merid. diff. lat. :: departure : diff. longitude, with its varieties; and the triangle $am\pi$ would have three cases in addition to those exhibited above.

Referring to the example in art. 8, and having determined the latitude come to as therein specified, in order to find the difference of longitude we have,

Latitude of Oreby-point	58° 35′	mer. pts. 4361
Latitude come to	75 50	7167
Meridional difference of latitude		2808
Radius		10·0000000
Is to the tangent of the course	67°	10·3721481
As meridional diff. of lat.	2808	3·4483971
To the diff. of longitude	6615¼	3·8205452
Longitude of Oreby-point		6° 37′ W.
Difference of longitude 6615¼ m. =		110 15¼ E.
Longitude come to		103 38¼ E.

whence it appears, that the ship arrived at Cape Cevero Vostochnoi in Asiatic Russia: but by middle latitude sailing she was 6° 23½′ to the westward of that cape, which shews, that the mode of computing the longitude by middle-latitude sailing is very erroneous, particularly at a distance from the equator.

11. It is now manifest that when the difference of longitude is one of the data, a table of the lengths of the protracted meridians or meridional parts, to every degree and minute of the quadrant, is necessary, to facilitate the computations in Mercator's sailing: and such a table may be computed with ease:

For $DI : CQ :: \dot{QI} : \frac{CQ}{DI} \times \dot{QI} = \dot{si} = \dot{Q\iota} :: \dot{CD}$: $\dot{QI} = \frac{CQ}{DI} \times \dot{CD}$, hence $\dot{Q\iota} = \frac{CQ^2}{DI^2} \times \dot{CD} = \frac{CQ^2 \times \dot{CD}}{CQ^2 - CD^2}$, and therefore $Q\iota = \int \frac{CQ^2 \times \dot{CD}}{CQ^2 - CD^2}$ =

CQ × hyp. log. $\left(\frac{\sqrt{CQ + CD}}{CQ - CD}\right)$ = CQ × H.L. $\left(\frac{\text{cotangent } \frac{1}{2}\text{ IP}}{CQ}\right)$.

To obtain Qt in terms of the tabular logarithms in which the ratio of 10 to 1 is expressed by 1000000000, it is to be recollected that in the hyperbolic system the same ratio is expressed by 2302585092, &c.; therefore, 2302585092 : 1000000000 : : H. L. $\left(\frac{\text{cot.}\frac{1}{2}\text{IP}}{CQ}\right)$: tab. log. $\left(\frac{\text{cot.}\frac{1}{2}\text{IP}}{CQ}\right)$; consequently, CQ × H.L. $\left(\frac{\text{cot.}\frac{1}{2}\text{IP}}{CQ}\right)$ = CQ × 2·302585092 × log. $\left(\frac{\text{cot.}\frac{1}{2}\text{IP}}{CQ}\right)$. And, to reduce this expression to minutes of a degree, which is the most convenient form for practice, the well-known ratio of the circumference of a circle to its radius gives this proportion 6·283185307 : 1 : : 21600′ (360°) : 3437·746770849 minutes in the radius CQ.

$$\text{Consequently, } Qt = 3437{\cdot}746770849 \times 2{\cdot}302585092 \times \log.\left(\frac{\text{cot. }\frac{1}{2}\text{ IP}}{CQ}\right)$$

$$= 7915{\cdot}704468046 \times \log.\left(\frac{\text{cot. }\frac{1}{2}\text{ IP}}{CQ}\right) = \frac{1}{{\cdot}00012633114387} \times \log.\left(\frac{\text{cot. }\frac{1}{2}\text{ IP}}{CQ}\right)$$

$$= \frac{10000000}{1263{\cdot}3114387}\,^{*} \times \log.\left(\frac{\text{cot. }\frac{1}{2}\text{ IP}}{CQ.}\right)$$

Example. If it were required to find the length of the protracted meridian, or meridional parts for 50°:

Log. cotangent of $\left(\frac{90° - 50°}{2}\right)$	20° —	10·4389341		
Logarithm of the radius CQ	- -	10·0000000		
Difference × 10000000 =	- - - -	4389341	its log. is - -	6·6424000
Logarithm of the constant number	- -	1263·3114387	- -	3·1015104
Protracted meridian for 50° =	- -	3474·481	- - - - -	3·5408896

Thus may the lengths of the protracted meridians be determined to every subdivision of the quadrant; and when computed and arranged for the seaman's use, is called a Table of Meridional Parts.

That such a table is not absolutely necessary will obviously appear if we put R = the logarithm of the radius, T, t = the logarithmic cotangents of half the complements of the latitudes QI. QK respectively, and δ = the constant quantity ·00012633114387:— because then $\frac{T - R}{\delta}$ = QI, and for the same reason $\frac{t - R}{\delta}$ † = QK; therefore the meridional difference of latitude IK = QK ± QI = $\frac{t \pm T}{\delta}$ *. Now we have seen (art. 10.) that CQ : tang. AQI : : IK = $\alpha\nu'$: $\nu'\phi'$; that is, radius : tang. course : : mer. diff. lat. $\left(\frac{t \pm T}{\delta}\right)$: diff. of long. which analogy gives $\nu'\phi' = \frac{\text{tang. AQI} \times \alpha\nu'}{CQ} = \frac{\text{tang. AQI} \times (t \pm T)}{CQ \times \delta}$; therefore, the complement of the log. of the constant quantity δ + log. ($t \pm T$) + log. tang. course — log. radius = logarithm of the difference of longitude.

Taking the former example,

½ co. lat. { C. Cevero Vostochnoi	7° 5′ log. cot.	10·9056645			
½ co. lat. { Oreby-point -	15 42½ log. cot.	10·5509164	complement of const. log.		6·8984896
Difference (t — T) - -		3547481	its logarithm	-	6·5499202
Log. tangent of the course 67°		-	-	-	10·3721481
Log. of the difference of longitude 6615·4 = 110° 15′ 4				-	3·82[illegible]579

Consequently, the meridional parts may not only be readily deduced from a table of logarithmic tangents, but the latter is fully competent to supply the place of the former.

The cases or varieties in the protracted triangle $\alpha\nu'\phi'$ are:

(1). Tangent of the course = $\frac{\nu'\phi' \times \text{radius} \times \delta}{(t \pm T.)}$.

(2). Difference of longitude $\nu'\phi'$ = $\frac{\text{tang. course} \times (t \pm T)}{CQ \times \delta}$

(3). Mer. diff. of lat. (t = T) = $\frac{\nu'\phi' \times CQ \times \delta}{\text{tang. course}}$.

12. As an investigation of the nature of the rhumb when transferred from the sphere to Mercator's chart may be justly deemed an inferior concern; yet, as it may gratify the young inquirer, and tend to illustrate and extend these researches, we shall just glance at its chief properties.

We have seen (art. 10.) that $\dot{QR}$ = $\frac{\text{tang. AQI} \times CI \times \dot{CI}}{CQ^2}$, but (Crackelt's translation of Mauduit's Trigonometry, chapter V.

* It is here admitted that the radius of the table is 10000000, but when it is 1000000, 100000, &c. the constant denominator will become 126·33114387, 12·633114387, &c.

† Minus, when the latitudes are of the same name, but plus when of contrary names.

lemma 2) $\mathrm{C}i^2 : : \mathrm{CQ}^2 : : \dot{\mathrm{Q}i} : \dot{\mathrm{QI}} = \frac{\mathrm{CQ}^2 \times \dot{\mathrm{Q}i}}{\mathrm{C}i^2}$,

whence $\dot{\overline{\mathrm{QR}}}$ is likewise $= \frac{\text{tang. AQI} \times \dot{\mathrm{Q}i}}{\mathrm{C}i} =$

$\frac{\text{tang. AQI} \times \dot{\mathrm{QI}}}{\sqrt{\mathrm{CQ}^2 + \mathrm{Q}i^2}}$: therefore tang. AQI : CI : : $\dot{\mathrm{QR}}$: $\dot{\mathrm{Q}i}$: : $a'b' : b'f'$; hence, if $\gamma'a'$ be produced until aT $=$ Ci, and upon a line drawn through T at right angles to Ta, TV be taken $=$ the tangent of the constant angle AQI, then will the line joining the points v, a', be a tangent to the curve (into which the rhumb QAF is projected), in the point A: consequently all the rhumbs, which meet the meridians obliquely, are in this projection mechanical or transcendental curves, having a point of contrary flexure where they cut the equator.

Now, since $\mathrm{QR} = \int \frac{\text{tang. AQI} \times \dot{\mathrm{QI}}}{\sqrt{\mathrm{CQ}^2 + \mathrm{C}i^2}} =$ tang. AQI $\times$ H.L. $\left(\frac{\mathrm{QI} + \sqrt{\mathrm{CQ}^2 + \mathrm{Q}i^2}}{\mathrm{CQ}}\right)$, and QR, Q$i$, are respectively equal to QR$'$ Ra', this equation expresses the relation between QR, Qi on the globe, or, which is equivalent, between the abscessa QR$'$ and ordinate R$'a'$ on the chart.

And because $\frac{\mathrm{Q}i + \sqrt{\mathrm{CQ}^2 + \mathrm{Q}i^2}}{\mathrm{CQ}} =$ tang. $\frac{45° + \mathrm{QI}}{\mathrm{CQ}} = \frac{\text{cotang. } \frac{1}{2}\,\mathrm{IP}}{\mathrm{CQ}}$, the abscissa QR$'$ $=$ tang. AQI $\times$ hyp. log. $\left(\frac{\text{cot. } \frac{1}{2}\,\mathrm{IP}}{\mathrm{CQ}}\right)$: but the protracted meridian Qι $=$ CQ $\times$ hyp. log. $\left(\frac{\text{cot. } \frac{1}{2}\,\mathrm{IP}}{\mathrm{CQ}}\right)$ therefore $\mathrm{QR}' = \frac{\text{tang AQI} \times \mathrm{Q}\iota}{\mathrm{CQ}}$: whence any number of points in the curve may be found with great facility.

When AQI $=$ 45°, the abscessa QR$'$ is equal to the protracted meridian Qι. When AQI $=$ 30°, the abscissa QR$'$ is just half the abscissa to a course of 60°.

Hence, notwithstanding the results deduced from the projection under consideration are perfectly accurate, and the right line Qϕ' is a competent succedaneum for the rhumb QAF; yet the former is the actual representation of the latter only when its direction is north and south, or east and west.

13. That the use of Mercator's chart may be the more obvious: conceive the degrees of longitude laid off upon QW$'$, $\kappa\phi''$ from a scale of equal parts, and the protracted degrees corresponding to the latitudes upon the meridians Qκ', W$'\phi'$, then

(1). The latitude of any place, as v, may be found by applying the least distance between that place and the nearest parallel $\iota\beta$ to the graduated meridian from ι or β in the direction $\iota\kappa$.

(2). The longitude is found by applying the least distance between the given place and the nearest meridian to the equator or graduated line QW$'$.

(3). The course or bearing of one place from another, as α' and ϕ', is the quantity of the angle which the line $\alpha'\phi'$ joining these places makes with the meridian $\alpha'\nu'$ drawn through one of them; and is readily determined by the line of chords, or by the rhumbs which are usually drawn upon charts.

(4). The distance of α' and ϕ' is accurately determined by taking the degrees and minutes intercepted between (ι and κ') the parallels drawn through these places, from QW$'$ and laying them off on the meridian drawn through α' from α' to m; then the perpendicular $m\pi$ will meet $\alpha'\phi'$ in the point π, and $\alpha'\pi$ applied to QW gives the required distance. Methods more facile, though less correct, might have been particularized.

If the places were under the same meridian, as α' and ν', then $\alpha'm$ is their distance.

To determine the distance of two places which are both on the same parallel of latitude, as ι and β.

Upon the base $\iota\beta$ constitute the isosceles triangle $\iota\beta z$, whose sides ιz, βz, shall be equal to CQ the radius of projection; from a line of sines to the same radius take the cosine of the latitude Qι, and set it from z to x and y, then xy applied to the graduated equator gives the distance of $\iota\beta$ in degrees and minutes.

When the chart is upon a large scale this *true* method becomes very inconvenient.

When they are upon the same parallel, if half the interval between them be laid off upon the graduated meridian on each side of the given parallel, the intercepted degrees will be the distance, nearly, provided the distance is small, and the parallel near the equator. If this be not the case, take a small extent from that part of the meridian which the given parallel intersects, then the degrees contained in this space being multiplied into the extents, and parts of an extent intercepted between the given places, will give the required distance nearer the truth.

(14). In compliance with custom we have adverted to plane and middle latitude sailing. It ought, however, to be recollected, when plane sailing was the only mode of computing a ship's place, the discerning mariner, as well as the mathematician, sensible of its erroneous results, had recourse to various approximating methods to obviate its defects, and determine the ship's easting or westing with more precision. In these researches, middle latitude sailing originated and was first published in Mr. Edmund Gunter's works in 1623, twenty-nine years after Mr. Edward Wright's true method of rendering the meridian proportional to the protracted parallels had appeared in Blundeville's Exercises, and twenty-four after Mr. Wright himself had more fully elucidated that proposition in his Correction of certain Errors in Navigation.

Whether middle-latitude sailing was invented previously to 1623, or Mr. Gunter was the author of it, is uncertain. He introduces it to find the inclination of the rhumb which passes through two places whose latitudes and longitudes are known.

Having given this erroneous proposition, "The diff. lat. : diff. long. : : tang 45° : tang. of the inclin. of the rhumb." He remarks, "the rhumb so found is always greater than it should be," and that,

"Radius : cos. mid. lat. : : tang. of the rhumb found : tang. of a second rhumb, sufficient for the seaman's use." Which analogies are equivalent to

Diff. lat. : diff. long. : : cosine of the mid. lat. : tang. of the course.

At that time, when the true method of solving the question was perhaps but imperfectly and partially known, this was the less objectionable: but considering it, as it really is, a source that hourly may produce, and probably frequently has pro-

duced the most disastrous consequences, and at the same time full as laborious as the true method, that certainly ought not to be brought in competition with this.

Why it still retains a place in every treatise on navigation, and even precedes the true method, is to us inexplicable. All that can be said in its behalf is, that for 45 or 50 degrees on each side of the equator its results are pretty near the truth: we admit that the meridians converge quickest, and consequently that it is most erroneous, *cateris paribus*, beyond the specified limits. We likewise know the force of acquired habits, and fear the seaman seldom alters his mode of calculation with his latitude.

As far as the course, distance, and latitude are concerned, plane sailing is correct (art. 6.) although it is no acquisition, unless trigonometrical exercises be considered such: for we have seen that a triangle, constituted from the same data, occurs in Mercator's sailing. But when it is applied to "working traverses," as almost every British navigator does apply it, and admits in his practice that he has sailed from noon to noon upon a plane, whatever distance he may have run, or in whatever latitude he may be; then, if his data include either easting or westing, errors are inevitably introduced. We therefore trust, that period is fast approaching when the seaman's time shall no longer be occupied in learning what may prove fatal to him, as well as the lives and property with which he may be entrusted; nor find the requisite volume swelled, and consequently the value enhanced, with what is worse than useless.

15. Having already developed the method of solving a single course, we shall proceed to consider *compound courses*, or *traverses*.

Accuracy, as far as it is possibly attainable, ought particularly to be the navigator's aim; yet a few minutes in the course or tenths of a mile in the distance run, is not so much to be feared as false principles.

The almost impossibility of either steering a ship, or measuring her velocity, under the most favourable circumstances, to the desired degree of precision, render nice calculations the less material: whence, the result of an analogy, either by Gunter's scale, or the traverse table, more particularly the latter, may be as near the truth as data can be obtained. And as these modes of solution are both facile and expeditious, they deserve to be noticed.

The lines upon Gunter's scale which claim our immediate attention are concise logarithmic tables of numbers, sines, tangents, and secants.

Now logarithms are only the ratios of numbers, and the ratios of all proportional numbers are equal: therefore the distance or ratio between the first and second terms, is equal to the distance or ratio between the third and fourth; and consequently,

The extent of the compasses from the first term to the third will reach, in the same direction, from the second term to the fourth: the first and third terms being of the same denomination; but when the first and second are of the same name,

The extent from the first to the second will reach from the third to the fourth.

Ex. The latitude and longitude left are 14° 30′ N. and 26° 5′E respectively, the course WSW. and distance run 500 miles. Required the latitude and longitude come to?

The extent from 8 points to 6 points (the complement of the course) on sine rhumbs, will reach from the distance 500, to the difference of latitude 462 on the line of numbers.

Hence the latitude come to is 6° 48′ N. and therefore the meridional difference of latitude 470 miles.

Then, the extent from 4 points to 2 points on tangent rhumbs will reach from the meridional difference of latitude 470, to the difference of longitude 195 on the line of numbers.

Whence the longitude come to is 23° 50′E.

16. The traverse table is a table of right-angled plane triangles whose angles exhibit,

(1.) The points and quarters in a quadrant of the compass: and

(2.) The degrees in a quadrant of a circle: while the linear values shew the lengths of the base and perpendicular corresponding to the hypothenuse which begins with unity, and increases as far as the author deems necessary by the continual addition of that number.

If requisite these values may be extended at pleasure, either by adding two or more together, or by taking the halves, thirds, fourths, &c. and then doubling, tripling, quadrupling, &c. the required value, which corresponds to the given parts.

It seems almost unnecessary to observe, that although the columns which contain the legs of the triangle are entitled *difference of latitude and departure*, yet these are analogous to the meridional difference of latitude and difference of longitude (art. 10), and consequently the table is applicable to all the varieties of Mercator's sailing.

Returning to the last example.

To course 2 points and distance 480 miles, the diff. of lat. is 443·5.

To course 2 points and distance 20 miles, the diff. of lat. is 18.5.

Hence, to course two points and distance 500 miles, the diff. of lat. is 462 miles = 7° 42′, therefore the latitude come to is 6° 48′N and the meridional difference of latitude 470 miles.

Then, to the course 2 points and the meridional difference of latitude (in a latitude column) the corresponding difference of longitude (in a departure column) is 195 miles = 3° 15′, and consequently the longitude is 23° 50′E.

17. In order to reduce several compound courses into one, or "work a traverse,"

Form a table consisting of nine columns, and beginning at the left hand, entitle them successively, courses, distances, diff. of lat. successive

N. | S.

latitudes, meridional parts, meridional difference of latitude, diff. of longitude.

E. | W.

Having inserted the several courses and distances in the columns assigned to them: To the first course and distance find the corresponding difference of latitude, observe whether it be N. or S. and place it under N. or S. accordingly: and apply it to the latitude left by addition or subtraction, as they are of the same or a contrary name.

Write the sum or difference, as the case may be, under successive latitude: and thus determine the successive latitudes to every course.

The meridional parts to each successive latitude being placed in the column bearing that title, insert the difference of each adjacent pair under meridional difference of latitude.

To every course and corresponding meridional difference of latitude find the difference of longi-

tude, and accordingly as it is east or west place it under E. or W.

Then will the difference of the sums of the columns entitled N. and S. be the whole difference of latitude: and the difference of the sums of the columns entitled E. and W. be the whole difference of longitude.

It is obvious that the last quantity in the column of successive latitudes is the latitude of the ship at the moment she finishes the last distance which is taken into the account; and that the longitude at the same instant of time is obtained by applying its difference to the longitude left. Thus may the longitude be computed to the same degree of accuracy as the latitude, and the dead reckoning duly kept with very little more labour than by plane sailing.

Ex. I Yesterday at noon we were in latitude 38°14'N. longitude 25°56'W. and have since run the following courses and distances:—

(1). N.E. b N. ½E. 56m. (2). N.N.W. 38m. (3). N.W. b. W. 46m.
(4). S.S.E. - - 30m. (5). S. b. W. 20m. (6). N.E. b. N. 60m.

Required the ship's place with her direct course and distance?

Courses.	Distances.	Diff. of lat. N.	Diff. of lat. S.	Successive latitudes.	Merid. parts.	Merid. diff. lat.	Diff. of long. E.	Diff. of long. W.
	•			38° 14'	2486·1			
N.E. b. N. ½E.	56	45·0		38 59	2543·7	57·6	43·8	
N N.W.	38	35 1		39 34	2588·9	45·2		18·7
N.W. b. W.	46	25·6		40 0	2622·7	33·8		50·5
S.S.E.	30		27·7	39 32	2586·3	36·4	15·0	
S. b W.	20		19 6	39 12	2560·4	25·9		5·1
N.E. b. N.	60	50 0		40 2	2625·3	64·9	43·3	
		155·7	47 3				102·1	74 3
		47·3					74·3	
	Diff. of lat.	108·4 = 1° 48' N.				diff. of long. 27·8 E.		

Hence, either by the last successive latitude, or by adding 1° 48' to the latitude left, it appears the ship was in 40° 2'N. latitude: and by taking 28' from 25° 56', leaves her longitude = 25° 28' W.

Then, mer. diff. lat. 139 2 : diff. long. 27·8 : : radius : tang course 11° 18', and cosine course 11° 18 : pr. diff. lat. 108·4 : : radius : distance 110½ miles.

Ex. II. A ship from Cape Nassau in Nova Zembla, latitude 69° 55' N, longitude 57° 50'E, after having sailed W. by N. ¾ N 960 m. N. W. 304m. S.E. b S. 480 m. and S. 60° 30'W. 636 m. arrived at a certain port. Required its latitude and longitude.

Owing to the error which the misapplication of the departure produces, we sincerely wish it obliterated from the navigator's vocabulary: yet, in this example, in addition to the columns prescribed above, we shall entitle two superfluous columns departure, to obtain another opportunity of com-
E. | W.
paring the prevailing method of computing the longitude with the true.

Courses.	Dist.	Diff. of lat. N.	Diff. of lat. S.	Departure. E.	Departure. W.	Successive latitudes.	Merid. parts.	Merid. diff. lat.	Diff. of long. E.	Diff. of long. W.
						69° 55'	5951·33			
W. b. N. ¾N.	960	323			903·8	75 18	7040·58	1089 25		3044·10
N.W.	304	215			215·	78 53	8009·21	968·63		968·63
S.E. b. S.	480		399·5	266·7		72 13	6377·16	1632·05	1084·0	
S. 60" 30' W.	636		313 1		553·4	67 0	5474 01	903·15		1596 00
		538 0	712·6	266·7	1672·2				1084.0	5608·73
			538·0		266·7					1084 00
			174·6		1405·5					4524·73

To determine the difference of longitude from the departure.

Latitude left - - - - - 69° 55'N. mer. parts 5951·33 Longitude left 57° 50' E.
Difference of latitude 174·6 = 2 55 S. Diff. of longitude 75 25 W.
Latitude in - - - - - 67 0 N. mer. parts 5474·01 Longitude in 17 35 W.
Meridional diff. of latitude. - - - - - - - 477·32

The proper diff. of latitude,	174·6	Comp of log.	7·7579558.
Is to the merid. diff. of lat.	477·32	- - - -	2·6788096.
As the departure, - - -	1405·5	- - - -	3·1478308.
To the diff. of longitude,	3842·4 = 64°2′.	- - -	3·5845962.
Longitude left - - - -	57 50E.		
Longitude in - - - -	6 12W.		

Now the difference between 17° 35′ and 6° 12′ is 11° 23′: consequently the ship would be at Rikefiord in Iceland when the prevailing mode of computation made her 11° 23′ to the eastward of that place.

18. As tides, currents, and heave of the sea frequently affect the ship's velocity and direction, it is necessary that the navigator should investigate their nature and effect: the solution of this proposition is called CURRENT SAILING, and comprehends three cases.

(1). When the ship sails in the direction of the current. Then it is obvious that her velocity will be augmented by the velocity of the current. For instance: if the ship's apparent velocity, or rate of sailing as given by the log, be 8 knots, and the drift of the current be 2 knots, the ship's absolute velocity is equal to their sum, that is, 10 knots.

(2). When the ship sails directly against the current: in which case her absolute velocity will be equal to the difference between the apparent velocity and the velocity of the current. If these velocities be equal, the ship will remain stationary: if the velocity of the ship be greater than that of the current, her absolute motion will be a-head: but if it be less, she will make stern-way. For example, if the ship's rate of sailing, as given by the log, be 6 knots, she will remain stationary in a current whose drift is 6 knots: her absolute motion a-head will be 2 knots, if the drift of the current be 4: and her sternway will be 2 knots, if the drift of the current be 8.

(3). When the ship's course is oblique to the setting of the current: then her true course and distance will be compounded of the apparent course and distance, and of the setting and drift of the current. And the distance made good in a given time will be represented by the diagonal of a parallelogram, of which the apparent distance run by the ship and the drift of the current in that time are the sides. For example, suppose,

A ship from latitude 48° 30′N. longitude 15° 24′W. sails S.W. 8 miles an hour for 24 hours in a current setting W. b. S. 3 miles an hour: to find the latitude and longitude come to.

Through the point A (Fig. 7.) from which the ship sailed, draw the indefinite meridian AG, the SW rhumb AB, and the W. b. S. rhumb AC, making AB = 192 (24 × 8) and AC = 72 (24 × 3) miles; complete the parallelogram ABDC, and draw the diagonal AD.

Writers on mechanics have shewn that the diagonal AD is the equivalent of the two forces whose ratio is expressed by AB, AC, and whose directions coincide with these lines. (See Gregory's Mechanics, Vol. I. art. 41; *et alibi frequenter*.) But writers on navigation consider, that as the current sets in the direction of the line AC, which is parallel to BD, it will neither accelerate nor retard the ship's motion towards the line BD; that is, the wind will bring her to the line BD in the same time as if the current did not act: nor will the wind which blows in the direction AB, parallel to CD, either accelerate or retard the ship's motion toward the line CD, that is, the current will carry her to that line in the same time, as if the wind did not act: hence the wind acting alone would bring the ship to BD, in the same time as the current acting alone would carry her to CD; consequently, the ship at the end of that time will be found in both these lines, that is, in D, the point where they intersect.

Hence, the angle GAD is the course, AD the distance, and AE the space intercepted between A and E (the point where the perpendicular demitted from D upon the meridian AG meets the latter line) is the difference of latitude.

In order to ascertain the values of these quæsita, and likewise to determine the difference of longitude FG, we may conceive that the ship sailed from A to B, and from thence to D, and solve the compound course by the last article, thus:

Courses.	Distances.	Diff. of lat. N.	Diff. of lat. S.	Successive latitudes.	Merid. parts.	Merid. diff. lat.	Diff. of long. E.	Diff. of long. W.
				48° 30′	3336·58			
S.W.	192		135·8	46 14	3135·75	200·83		200·83
W. b. S.	72		14·0	46 0	3115·55	20·2		101·5

Difference of longitude FG - -	5° 2½′ W.	=	302·53
Longitude left - - - -	15 24 W.		
Longitude in - -	20° 26½ W.		

Therefore the latitude come to is 46° N. and longitude 20° 26½′ W.

We might here have introduced oblique and *windward sailing*; but conceive, that although the first be a fertile source of exercises in plane trigonometry, yet its utility is principally limited to marine surveying, and that the latter ought to be referred to seamanship.

19. The shortest distance, *cæteris paribus*, is his primary consideration who wishes to perform a journey in the shortest possible time: but when the advantage in point of space is counterbalanced by serious obstacles, the traveller hesitates: thus is the mariner situated in the case before us; for,

although the requisite operations in Mercator's sailing may be performed with facility, and the results are rigidly accurate, yet the space passed over by the ship which sails from A to B, agreeably to that hypothesis, is seldom the shortest, for the arc of a great circle intercepted between those points is the shortest distance between them; but a rhumb coincides with an arc of a great circle only when the ship sails either upon the equator or upon a meridian (art. 3): and consequently in every other case the length of the segment of the rhumb intercepted between the points A and B exceeds the intercepted arc of a great circle. Hence if a ship could be conducted upon the arc of a great circle with the same facility as upon a rhumb, that mode of sailing would be highly preferable.

We have already remarked, that the angle which a great circle makes with the meridians is continually varying; therefore in order that a ship may sail from A to B upon that arc, she must change her course at every point, or in every moment of her progress, which is manifestly impracticable; for, previous to a ship's course being known, it must continue constant for some space of time, and whilst it continues constant, the ship describes a rhumb: it is therefore impossible to conduct a ship upon the arc of a great circle, the meridians and equator excepted; yet, wind, shoals, and land permitting, she may be frequently brought upon it, and always kept near it; and this, because of the intention, is called GREAT CIRCLE SAILING.

It is obvious that the utility of great circle sailing must be chiefly confined to extensive tracts of ocean in which the monsoons prevail, since it enables the navigator, under those circumstances, to shorten the space he must necessarily pass over: hence, notwithstanding the numerous varieties this species of sailing admits of, we shall confine our researches to the artifice by which a ship is frequently brought upon and always kept near the arc of a great circle.

In Fig. 8 Pl. 115, the port sailed from, that bound to, and the elevated pole, are respectively represented by A, B, S, and SD is a perpendicular demitted from S, upon the great circle described through A and B. We have seen that a momentaneous change of the course is impracticable, but the ship may describe rhumbs between A and a, a and b, b and c, &c. where a, b, c, &c. are assigned points in the arc AB. If the distance of those points be small, the difference between the intercepted segments of the rhumb and arc will be inconsiderable. For the circular arc in some measure represents the chord of the rhumb, and the difference between an arc of 10° and its chord is only ·0017694, yet this is not to be understood as a fair criterion of the difference of the intercepted circular and spiral segments; for that difference will be much smaller when the navigation is near the equator, or the course near the meridian in any latitude, than when the course is wide and the latitude high.

Now, in order to obtain data for conducting the ship in the manner proposed, in the triangle ASB, the sides AS, BS, the complements of the latitudes of A and B, together with the difference of their longitudes, measured by the angle ASB are given, hence AB and the angles SAB, SBA becomes known. Then, in the right-angled spherical triangle SDA, the hypothenuse SA, and the angle SAD, are given to find the perpendicular SD and the angle ASD.

Having described a meridian through the points S, a: because the angle ASa is an assigned quantity, the angle DSa is known; and therefore in the right-angled spherical triangle DSa, the perpendicular SD and angle DSa are given to find Sa, the complement of the latitude of the point a. Thus may the latitudes of the several points b, c, d, &c. be ascertained; and consequently, from these and the assumed longitudes the courses and distances between them obtained by art. 10. For an example,

If it were required to conduct a ship, agreeably to this hypothesis, from the Cape of Good Hope, in latitude 34° 29′ S. longitude 18° 23′ E. to Bencoolen, whose latitude is 3° 49′ S. and longitude 102° 2′ E. varying her course at every tenth degree of longitude: to find the latitudes and longitudes of the points (a, b, c, &c.) where her course must be altered, and also the courses and distances between them?

The Cape, Bencoolen, and the south pole, being represented by A, B, and S, respectively. In the triangle ASB, AS = 55° 31′, BS = 86° 11′, and the included angle ASB = 83° 39′ are given.

To find the distance AB.

Logarithmic versed sine of angle ASB =	83° 39′		9·9490963
Logarithmic sine of AS	55 31		9·9160805
Logarithmic sine of BS	86 11		9·9990357
Sum, rejecting twice radius		9·3642125 = log. of the number	7314969
Natural versed sine of the difference of the sides BS, AS			1398509
Sum or natural versed sine of the distance AB = 82° 36′ 29″			8713478

Then, sine AB 82° 36′ 29″: sine angle ASB 83° 39′ :: sine AS 55° 31′: sine angle ABS 55° 42′ (the angle of position at the Cape) :: sine SB 86° 11′: sine angle SAB 8934 (the angle of position at Bencoolen).

Hence, radius : sine SB 86° 11′ :: sine angle ABS 55° 42′ : sine of the perpendicular SD = 55° 30′ 51″.

And, cotangent of angle DBS 55° 42′ : radius :: cosine SB 86° 11′ : cotangent of the polar angle BSD = 84° 25′ 37″.

The difference of longitude 83° 39′ being taken from the angle BSD 84° 25′ 37″, leaves the angle ASD = 0° 46′ 37″, the difference of longitude between the Cape and the perpendicular SD.

The arcs of co-latitude Sa, Sb, Sc, &c. being described, making the angles DSa, DSb, DSc, &c. = 11° 21° 31°, &c. as in the first column of the following table, with these angles, and the perpendicular SD the several latitudes where the ship alters her course, are found by saying, as

Radius	10·0000000
Cotangent SD 55° 30′ 51″	9·8366335
Cosine of polar angle DSa 10°	9·9919466
Cotangent of lat. of a 38° 58′ 30″	9·8285801

Radius	10·0000000
Cotangent SD 55° 30′ 51″	9·8366335
Cosine of polar angle DSb 21°	9·9919466
Cotangent of lat. b 32° 39′ 19″	9·8067852

The latitudes of the points *a*, *b*, *c*, &c. being obtained as in the third column, and their longitudes known; from these, by Mercator's sailing, are deduced the successive courses the ship must steer, and distances she ought to run, as specified in the eighth and ninth columns.

Polar angles	Successive longitudes.	Successive latitudes.	Difference longitudes	Difference latitude.	Meridional parts.	Merid. differ. latitude.	Courses.	Distances.
	15° 23′ 0″	34° 29′ 0″	615·39	50·5	2206·56	36·89	86° 35′ 30″	508·06
DS*a* = 11°	28 36 23	33 58 30	600·—	79·18	2169 67	94·74	81 1 57	507·68
DS*b* = 21	38 36 23	32 39 19	600·—	130 87	2074 93	153·63	75 38 17	527·58
DS*c* = 31	48 36 23	30 23 27	600·—	185·13	1921·30	211·56	70 54 38	536 73
DS*d* = 41	58 36 23	27 23 19	600 —	241·40	1709·74	257·27	65 59 22	593·12
DS*e* = 51	68 36 23	23 21 55	600·—	297·42	1442·47	318·47	62 2 29	631·38
DS*f* = 61	78 36 23	18 24 30	600·—	348·58	1124·00	361·92	58 54 4	674·87
DS*g* = 71	88 36 23	12 35 55	805 62	526 92	762·08	532·91	56 30 57	955 07
	102 2 0	5 49 0			229·17			

Sum of the rhumbs A*a*, *ab*, *bc*, &c. - - - -	4957·07
Length of the arc AB 82° 56′ 29″ = - - - -	4956·48
Difference - - - - - - -	1·01
To find the distance between A and B by Mercator's sailing.	
Merid. diff. lat. 1477·39 : diff. long. 5019 :: radius : tang. course 68° 28′ 37″ -	
Cosine course 68° 28′ 37″ : diff. lat. 1840 : : radius : distance - - - -	5015·32
Which is - - - - - - - - - -	58·84
miles more than the length of the arc A B.	

Having here aspired at accuracy only to exhibit the true difference of the intercepted arcs and rhumbs, yet we may be allowed to observe once for all, that these rigorous calculations are as inconvenient as unnecessary to the practical navigator.

We have hitherto considered the earth as a sphere, and but for the inaccuracy which unavoidably exists in the modes of estimating the ship's course and distance, the doubts whether the northern and southern hemispheres be similar figures, the uncertainty of the ratio of the equatorial and polar diameters, and particularly the trivial effect which the ratio of greatest inequality that has been assigned to the axes would produce in a ship's dead reckoning, we would here have considered the method of estimating a ship's relative situation agreeably to the spheroidal hypothesis. For these reasons, however, together with the restricted view to which we are indispensably limited, such researches might be justly deemed nugatory. Those who wish to see the subject treated in as plain a manner perhaps as its nature will admit, may consult Robertson's Navigation, book viii. sect. 8.

20. Were the application of the principles which we have elucidated always practicable, the ship's place might be determined at any time to the same degree of precision as the data upon which it depends. But incidents may often occur to baffle the most accomplished, experienced, and indefatigable navigator. Thus circumstanced, he has recourse to celestial observations to ascertain his latitude and longitude.

As these problems are independent of each other, we shall first inquire how the latitude may be found. For this purpose, let Fig. 9. be a stereographic projection of the sphere upon the plane of the meridian HZR; where HR is the horizon, Z its pole or the observer's zenith, EQ the equator, P its elevated pole, and ☉ the observed place of the sun or a star; then will H☉ or R☉ be the altitude of the object when on the meridian, Z☉ its zenith distance, and E☉ the declination.

Now the latitude is equal to the angle which the

equator makes with the prime vertical, as well as to the height of the pole above the horizon: consequently, when the arcs $R\odot$ $\odot E$ are given, the latitude $EZ = RP$ becomes known. For it is obvious that EZ is equal to the sum of the arcs $Z\odot$ $\odot E$ when they are of the same name, and to their difference when of contrary names: except when $\odot$ is between the horizon and elevated pole, in which case the sum of ($R\odot$) the altitude, and ($\odot P$) the polar distance, gives the latitude.

Example January 1st, 1811, the meridian altitude of the sun's lower limb was 34° 15′ 30″, the observer being N. of the sun and the height of his eye 18 feet, longitude by estimation 60 W. Required the latitude?

Obs. alt. of the sun's lower limb				34° 15′ 30″ S.
Sun's semidiamenter	16′ 18″	} Diff. +		12′ 14″
Dip 18 feet	4 4			
Sun's apparent altitude				34 27 44
Refraction	1 23	} Diff. −		1 15
Parallax	8			
Sun's true altitude				34 26 29

Sun's declination Jan. 1st.	23° 3′ 52″ S.
Correction for 60° W.	49
Reduced declination	23 3 3
Zenith distance	55 33 31 N.
Latitude	32 30 28 N.

21. Hence, it is obvious that the determination of the latitude, if we could always observe the meridian altitude of an object whose declination is known, would be an easy problem; but clouds very frequently prevent this observation. The mariner therefore requires other methods of determining the latitude; and the one which is best adapted, and has been most approved, is that which gives the latitude from the sun's declination two altitudes, and the interval of times between the observations. The requisite operation is necessarily rather long and complicated, and may at first sight appear very formidable; but, as in other instances, a little acquaintance with it causes its terrors to disappear.

To illustrate the direct method of solution, let Z (Fig. 9) be the zenith, P the pole, $PS = Ps$ the sun's polar distance at the middle time between the observations, and Ss the places of the sun corrected for semidiameter, dip, refraction, and parallax. Then in the isosceles triangle SPs, the equal sides SP, sP, and included angle SPs, which measures the interval between the observations, are given to find Ss and the angle PSs; and in the triangle SZs, the three sides are given to find the angle ZSs; then $ZSP = PSs \pm ZSs$: hence in the triangle ZSP, the sides ZS SP, and included angle ZSP, are given to find ZP, the complement of the latitude corresponding to the time to which the declination is reduced.

Example. From observations taken in the northern hemisphere.

$\odot$'s true altitudes.	Half interval.	$\odot$'s declaration.	$\odot$'s polar distance.
45° 5′ 42″	1h. 30m. = 22° 30′	12° 0′ N.	78° 0′
5 36 6		Vide Philos. Trans. for 1797, p. 113.	

SP = 78°	sine 9·9904044		cosine	9·3178789
SPC = 22 30	sine 9·5828397		tangent	9·6172243
SC = 21 58 56″	sine 9·5732441	PSs = 85° 4′ 20″	cotangent	8 9351032
2				

Ss = 43 57 52	Ss = 43° 57′ 52″	Coseccant ·1585088		90°
				45 5 42″
SZ = 84 23 54	zs = 84 23 54	Coseccant ·0020790	zs =	44 54 18
D = 40 26 2	½ (zs + D) = 42 40 10	Sine 9 8310808		90°
ZS = 44 54 18	½ (zs − D) = 2 15 18	Sine 8·5911512		5 36′ 6″
(zs + D) = 85 20 20		2)18·5828198	ZS =	84 23 54
(zs − D) = 2 28 16	½ zss = 11 16 51	Sine 9·2914099	PSC =	85 4 20
	zss = 22 32 41		zss =	22 33 42

9·7311170	log. verseds. ZSP	62 30 38
9·9904044	log. sine PS =	78
9·9979210	log. sine ZS =	84 23 54
9·7194424	log. of the number	5241341
	Nat. verseds. (ZS ∽ PS) 6° 23′ 54″	0062288
	Nat. coverseds. of the latitude RP = 28° 0′ 39″	5303629

If the interval between the observations be considerable, it may not only be necessary to reduce the altitude at the second observation to what it would have been if the observations had been taken at the same place (vide Vince's Practical Astron. p. 50), but likewise to consider PS, Ps equal to the true polar distances at the respective observations. (Vide Vince's Trig. art. 254).

This problem has engaged the attention of several eminent mathematicians, whose researches have been principally directed to an approximate method called Douwe's, employing as an element of calculation the latitude by account. This method, in its original form, was sometimes tedious, requiring a repetition of the operation, and when repeated not always leading to right conclusions. On this account Dr. Brinkley invented a supplementary process of computation, by which the latitude found by Douwe's method might be conveniently corrected. About the same time that this process, with its demonstration and tables, was published in the Nautical Almanac for 1797, a similar solution of the problem by M. Mendoza Rios was published in the Connoissance des Temps:

yet neither of these gentlemen's methods (if they may be called different methods), nor that by M. Kraft, given in the Nova acta Petropolitana for 1795, appear to have any advantage over the common and direct process noticed above. Indeed it is not obvious to us that the problem will admit of any considerable practical amelioration, independent of particular tables; and such the public is now favoured with by M. Mendoza Rios, as judiciously constructed and arranged, perhaps, as could be desired.

22. The method of deducing the apparent time from the altitude and declination of the sun, together with the latitude of the ship, is a problem similar to that of ascertaining the true azimuth, art. 9.;—it was there shown, that in the triangle $Z\sigma P$, the three sides were given to find the angle $PZ\sigma$: here we have the same data to find the angle $ZP\sigma$, which measures the time from apparent noon; consequently, that angle may be determined by the direct and obvious method there exhibited.

We have glanced at this problem, because the apparent time is a requisite element of calculation in the determination of the longitude, by means of the moon's distance from the sun or a fixed star.

23. Of the various methods which have been proposed for the determination of the *longitude* of a ship, that by lunar observations claims the pre-eminence, both on account of the ease with which the necessary calculations are made, and because the requisite pheromena may be observed several times in almost every night.

The steps by which the longitude is obtained by his method are briefly these:

(1.) The true distance of the moon from the sun or fixed star being deduced from the observed distance and altitude of the objects.

(2.) The apparent time of observation at the ship ascertained.

(3.) And the time obtained from the Nautical Almanac, when the moon was at that distance, at Greenwich; then

(4.) The difference of those times is the ship's longitude.

Let σm, Fig. 9, be the observed places of the sun, or star, and moon, and σZ, mZ the complements of their altitudes. Then because the sun's parallax is less than the refraction at the same altitude, his true place will be lower than the apparent: while, on the contrary, the moon's parallax at any given altitude is grater than the refraction, and therefore her true place will be higher than the apparent. Whence, in the triangle $Z\sigma m$, the apparent zenith distances $Z\sigma$, Zm, and apparent distance σm are given, to find the angle at Z; then, with this angle and the true zenith distances ZS, ZM, find the true distance SM.

The determination of the true distance being the most laborious part of the operation, and but ill adapted to the mariner, whose education and employments exact a mode which shall be easy and compendious; this department of the problem has consequently been more particularly cultivated by mathematicians for these last fifty years: and whilst some were devising more facile methods of finding the corrected distance, others were investigating the correction of the distance: but an expression for the correction of the distance is more difficult to obtain than in the first moments of consideration it appears to be; we shall therefore only adduce an instance of finding the corrected distance.

For this purpose, put $\Sigma = \text{sine}\left(\dfrac{m\sigma + \overline{mZ \backsim \sigma Z}}{2}\right)$, $s = \text{sine}\left(\dfrac{m\sigma - \overline{mZ \backsim \sigma Z}}{2}\right)$ $\delta = \text{sine}\left(\dfrac{MZ \backsim ZS}{2}\right)$ and $x = \text{sine}\,\dfrac{MS}{2}$. Then by the theorem for finding an angle from the three sides,

$$\overline{\text{sine}}\,)^2\,\tfrac{1}{2}\text{ angle } MZS = \frac{\Sigma\, s}{\text{sine } m\sigma \times \text{sine } Z\sigma} = \frac{\text{sine } \overline{x+\delta} \times \text{sine } \overline{x-\delta}}{\text{sine } MS \times \text{sine } ZS};\text{ therefore}$$

$$\frac{\Sigma \times s \text{ sine } ZM \times \text{sine } ZS}{\text{sine } m\sigma \times \text{sine } Z\sigma} = \overline{x+\delta} \times \overline{x-\delta} = x^2 - \delta^2.$$

Put ϕ = half the sum of the log. sines of the factors in the numerator added to the log. cosecants of the factors in the denominator, from which subtract the log. of δ.

Then $\phi - \delta = \overline{\dfrac{x^2}{\delta^2} - 1}\,\Big|^{\frac{1}{2}}$ = the log. tangent of an arc whose secant is $\dfrac{x}{\delta}$ to radius unity, the log. sine of which is the log. of $\overline{\dfrac{x^2 - \delta^2}{x^2}}\Big|^{\frac{1}{2}}$, which put $= \lambda$; then $\phi - \lambda = \text{log.}\,\dfrac{\overline{x^2 - \delta^2}\,\Big|^{\frac{1}{2}}}{\overline{\dfrac{x^2 - \delta^2}{x^2}}\,\Big|} = \text{log.}\,x$; or log. sine of half the true distance.

Whence this practical rule.

(1.) Take the difference of the apparent altitudes of the moon and sun, or star, and the difference of their true zenith distances: also, half the sum, and half the difference of the apparent distance and difference of the apparent altitudes.

(2.) To the log. sines of the half sum and half difference add the log. sines of the true zenith distances, and the log. cosecants of the apparent zenith distances, and take half the sum.

(3.) From this half sum take the log. sine of the half difference of the true zenith distances, and the remainder is the log. tangent of an arc, the log. sine of which arc subtracted from the said half sum of the six logarithms leaves the log. sine of half the true distance. (See Ladies' Diary for 1787, qu. 873).

Example.

Given	Apparent distance of ☽ and ☉	108° 42′ 3″	☽'s hor. paral. 55′ 19″.
	Apparent altitude of ☽'s centre	54 11 37	
	Apparent altitude of ☉'s centre	6 27 54	
	True altitude of ☽'s centre	54 47 35	
	True altitude of ☉'s centre	6 20 1	

Vide Phil. Trans. for 1797, p. 117.

Apparent distance	108°	42′	3″			
Diff. of app. altitudes	47	44	23			
Sum	156	26	26			
Difference	60	57	40			
Half sum	78	13	13	Sine	9·9907559	
Half difference	30	28	50	Sine	9·7052185	
☉'s true zenith distance	83	39	59	Sine	9·9973412	
☽'s true zenith distance	35	12	25	Sine	9·7608229	
☉'s apparent zenith dist.	83	32	26	Cosecant	·0027658	
☽'s apparent zenith dist.	35	48	3	Cosecant	·2328669	
					2)39·6897712	
					19·8448856	(a)
Half diff. of true zen. dist.	24	13	47	Sine	9·6132032	
				Tangent of an arc	10·2316824	
				Corresponding sine	9·9357907	(b)
	54	13	26·3	sine	9·9090949	(a—b)
			2			
True distance	108	26	52·6			

☉'s true zen. dist.	83°	39′	59″
☽'s true zen. dist.	35	12	25
Difference	48	27	34
Half difference	24	13	47

Having ascertained the true distance, we are next to determine the time at Greenwich corresponding thereto. To effect which, take from the Nautical Almanac the distances next less and next greater, than the true distance deduced from observation, and the difference (D) of these distances gives the moon's access to or recess from the sun or star in three hours; then take the difference (d) between the moon's distance at the beginning of that interval, and the distance deduced from observation, and say D : d :: three hours : the time the moon is acceding to, receding from the sun or star by the quantity d, admitting the moon's motion uniform for the time, which, added to the time at the beginning of the interval, gives the apparent time at Greenwich corresponding to the given true distance of the moon from the sun or star.

Example. About 5 P.M. on the 18th January, 1804, in latitude 39° 20′ S. longitude, by estimation 88° E., the observed altitude of the sun's lower limb was 27° 55′, that of the moon's upper limb 52° 33′, and the distance of their nearest limbs 70° 26′ 10″, height of the eye 18 feet. The time of observation and longitude of the ship are required.

True distance of moon from sun at ship	70°	47′	34″
True dist. by Nautical Almanac, Jan. 17th, at 21 hours	69	55	26
True dist. by Nautical Almanac, Jan. 18th, at noon	71	33	27
D =	1	38	1
d =	0	52	8

Hence 1° 38′ 1″ : 52′ 8″ :: 3h. : 1h. 35m. 44s. which, added to 21 hours, gives 22 h. 35m. 44 s. the apparent time at Greenwich.

Then, the sun's polar distance (69° 15′ 49″), zenith distance (61° 54′ 25″), and the complement of the latitude (50° 40), are given, whence (art. 28) the hour angle from apparent noon = 70° 4′ 40″ = 4 h. 40 m. 19 s. P.M. on Jan. 18th. Hence

Apparent time at ship Jan. 18th.	4h.	40m.	19s.	P. M.
at Greenwich Jan. 17th.	22	35	44	A. M.
Diff. of meridians in time	6	4	35,	

which converted into degrees gives 91° 8′ 45″, the ship's longitude east of Greenwich.

Many other methods of ascertaining the longitude of a ship have been proposed. See Gregory's Astronomy, art. 660—681. But the method given above, with the assistance of M. Mendoza Rios' Nautical Tables, appears to us to be highly preferable for the practical navigator.

24. To elucidate the mode by which the navigator registers from time to time the necessary facts and occasional incidents or "keeps a journal:"—Admit that a ship bound from St. Helena to London finds the result of her reckoning at noon, on the 24th August, 1810, as below:

Course.	Dist.	Diff. of		N. lat. by		W. long. by		W. variat. by		Lizard.	
		Lat.	Long.	Acct.	Obs.	Acct.	Obs.	Acct.	Obs.	Bearing.	Dist.
N. 17° 30′ W.	135	129	43	21° 15′	21° 17′	27° 35′	27° 40′		½ pt.	N. 31° 52 E.	2025

To avoid verbosity, suppose the following a transcript of the log board for the ensuing day.

H.	K	F.	Courses.	Winds.	Lee-way.	Remarks ♄, August 25, 1810.
1	7	2	N.N.E.	W. b. N.		A steady gale and fine weather.
2	7	4				
3	7	6				A sail in the N.W. quarter.
4	7	4				
5	7	4				Hawled in the studding sails.
6	7	6				Handed top-gallant sails.
7	7	6	N.E. b. N.	N.N.W	1½	Fresh gales. Reefed topsails.
8	8	2				
9	8	7				
10	8	—				
11	8	—				
12	8	1	N. b. E.	W.N.W.	1½	Ditto weather.
1	8	3				
2	8	5				
3	8	7				
4	8	6				
5	8	4				Weather moderating. Out reefs of topsails.
6	8	2	North.	W.S.W		More moderate. Set top-gallant sails.
7	8	6				By obs. of ☽'s dist. from ☉, ship's long. at 7h. 30m. was 26° 34′ W.
8	9	4				
9	9	6				Variation per azimuth ¾ pts. W.
10	9	7				At 10 h. 45 m. A. M. the lat. from double alt. of the sun was 24° 19′ N.
11	9	7				
12	9	—				Fresh gales and hazy.

TRAVERSE TABLE.

Courses.	Dist.	Diff. of lat N.	Diff. of lat S.	Success. Lat.	Mer. pts.	Mer. Diff. Lat.	Diff. Long. E	Diff. Long. W
				21° 15′	1305	48		
N. b. E. ¼ E.	45	43·7	—	21 59	1353	32	12	—
N.E. ¼ N.	41	30·4	—	22 29	1385	52	29·2	—
N. b. E. ¾ E.	51	48·0	—	23 17	1457	70	18·7	—
N. ¾ W.	65	64·3	—	24 21	1507			10·3
							59·9	
							10·3	
							49·6	

From hence, after reducing the latitude and longitude by observation to noon, the ship's accounts will at that time be as under:

Course.	Dist.	Diff. of Lat.	Diff. of Long	N. lat. by Acct.	N. lat. by Obs.	W. long. by Acct.	W. long. by Obs	W. variat. by Acct.	W. variat. by Obs.	Lizard. Bearing.	Lizard. Dist.
N. 13° 54′ E.	192	186	50	24° 21′	24° 30′	26° 35′	26° 42′		¾ pts	N. 33° 39′ E.	1834

After this manner may the journal be continued from day to day.

As we conceive it would be the means not only of exciting the seaman to attend more assiduously to the course and distance made good by the ship, but might eventually lead to more accurate methods of estimation, we would wish to see the accounts by dead reckoning and observation continued separate during the voyage.

The conjectural method of correcting the dead reckoning, given in practical treatises, ought to be totally rejected.

*** For this neat and comprehensive, though concise, treatise on navigation we are indebted to a very ingenious and experienced mathematician, Mr. Adam Glendenning, of the Naval Hospital, Yarmouth, Norfolk. It may be considered as a specimen of a larger work, with which we hope he will soon be able to present the public.

NAVIGATION (Inland). See CANAL.

NAVI'GATOR. *s.* (*navigateur*, French.) Sailor; seaman; traveller by water (*Brere.*).

NAVIGATOR'S ISLANDS, a cluster of islands in the S. Pacific ocean. The inhabitants are a strong and handsome race; scarcely a man to be seen among them less than six feet high, and well proportioned. The women are delicately beautiful; their canoes, houses, &c. well constructed; and they are much more advanced in internal policy than any of the islands in this ocean. Lon. 169. 0 W. Lat. 14. 19 S. See MAOUNA.

NAU'LAGE. *s.* (*naulum*, Latin.) The freight of passengers in a ship.

NAULUM, in antiquity, was money put into the mouth of a person deceased at Rome, to pay Charon the ferryman for his passage, and this piece was to be of the current coin of the emperor that then reigned, which gave people afterwards an opportunity to know when such an one died.

NAUMACHIA, in antiquity, a show or spectacle among the ancient Romans, representing a sea-fight. These mock sea-fights are supposed to have originated at the time of the first Punic war, when the Romans first instructed their men in the knowledge of naval affairs. Afterwards they were intended to entertain the populace, as well as to improve the seamen. They were often, like other shows, exhibited at the expence of individuals, to increase their popularity. In these spectacles they sometimes strove to excel each other in swiftness; and sometimes engaged in a warlike manner. The naumachiæ of Claudius indeed was a most savage diversion. The combatants used to destroy each other to amuse a tyrant and a cruel mob. As they passed before him they used this melancholy greeting, *Ave Imperator, morituri te salutant.* The emperor replied, *Avete vos.* This they understood as an answer of kindness, and a grant of their lives; but they soon discovered that it proceeded from wanton cruelty, and barbarous insensibility. In the time of the emperor Domitian, such a vast number of vessels engaged as would have nearly formed two regular fleets for a real fight, and the channel of water was equal in magnitude to a natural river.

NAUMBERG, a town of Germany, in Lower Hesse, situate on the Eider, 11 miles W.S.W. of Cassel.

NAUMBERG, a town of Upper Saxony, in Thuringia, capital of a bishopric, united to the house of Saxony. It has a small citadel, and the cathedral is remarkable for its fine altars, paintings, and subterranean chapels. Here are manufactures of stockings and turnery wares, and vineyards that yield an excellent red wine. It is seated on the Saale, 37 miles E N.E. of Erfurt, and 60 W. of Dresden. Lon. 12. 0 E. Lat. 51. 11 N.

NAUPACTUS, or NAUPACTUM, a city of Ætolia, at the mouth of the Evenus. The word is derived from ναυς, and πηγνυμι, because it was there that the Heraclidæ built the first ship, which carried them to Peloponnesus.

NAUPLIUS, a son of Neptune and Amymone, king of Eubœa. He was father to Palamedes, who was sacrificed to the resentment of Ulysses by the Greeks, during the Trojan war. The death of Palamedes irritated Nauplius. When the Greeks returned from the Trojan war, Nauplius saw them with pleasure distressed in a storm on the coasts of Eubœa, and to make their disaster still more universal, he lighted fires on such places as were surrounded with the most dangerous rocks, that the fleet might be shipwrecked on the coast. This succeeded; but when he saw Ulysses and Diomedes escape, he threw himself into the sea. According to some mythologists there were two persons of this name. The second was an Argonaut, remarkable for his knowledge of sea affairs and of astronomy.

NAUSEA. (*nausea*, ναυσια, from ναυς, a ship; because it is a sensation similar to that which people experience upon sailing in a ship.) An inclination to vomit, without effecting it; also a disgust of food, approaching to vomiting. It is an attendant on cardialgia, and a variety of other disorders, pregnancy, &c. occasioning an aversion for food, an increase of saliva, disgusted ideas at the sight of various objects, loss of appetite, debility, &c.

To NAU'SEATE. *v. n.* (from *nauseo.* Lat.) To grow squeamish; to turn away with disgust (*Watts*).

To NAU'SEATE. *v. a.* 1. To loathe; to reject with disgust (*Pope*). 2. To strike with disgust (*Swift*).

NAU'SEOUS. *a.* (from *nausea*, Latin; *nausée*, French.) Loathsome; disgustful (*Den.*).

NAU'SEOUSLY. *ad* (from *nauseous.*) Loathsomely; disgustfully (*Dryden*).

NAU'SEOUSNESS. *s.* (from *nauseous.*) Loathsomeness; quality of raising disgust (*Dryden*).

NAUSICA, a daughter of Alcinous, king of the Phæaceans. She met Ulysses shipwrecked on her father's coasts, and it was to her humanity that he owed the kind reception he received from the king.

NAUTES, a Trojan soothsayer, who comforted Æneas when his fleet had been burnt in Sicily. He was the progenitor of the Nautii at Rome, a family to whom the Palladium of Troy was afterwards entrusted.

NAU'TIC. NAU'TICAL. *a.* (*nauticus*, Lat.) Pertaining to sailors (*Camden*).

NAUTILUS. Pearly nautilus. In zoology, a genus of the class vermes, order testacea. Animal, a kind of sepia; shell univalve, divided into several departments communicating with each other by an aperture. Thirty-one species, often confounded with the genus argonauta, or paper-nautilus, on account of the similarity of the names. They may be thus subdivided.

A. Spiral, rounded, with contiguous whorls, comprising fifteen species, of which nine are common to our own coasts, and found chiefly on the Sandwich shore, or on Sheppy island.

B. Spiral, rounded, with separated whorls.

Three species, found in the American and Indian oceans.

C. Elongated and straitish. Thirteen species, of which one is common to own country. The following are the chief:

1. N. pompilius. Aperture of the shell heart-shaped; whorls obtuse, smooth. Inhabits the Indian and African oceans; often very large, and finely variegated with brown flexuous streaks, spots or marks; within of a most beautiful pearly gloss. Of this shell the inhabitants of the east make drinking cups.

2. N. spicula. Aperture of the shell orbicular; whorl cylindrical. Inhabits the American and Indian oceans; about an inch in diameter; whitish, within shining, like mother-of-pearl; orbicular, the whorls gradually decreasing inwards, the first a little straight; siphon contiguous to the walls of the shells.

3. N. belemnita. Thunderstone. Shell equal, smooth, conic, acute; varying in size from half an inch to eight inches, a little transparent, and when burnt or rubbed, smelling like rasped horn. Found in a fossile state in most parts of Europe. It has received its English name from a notion that these shells are thunderbolts, and always appear after a storm.

The great and striking character of the genus, at least so far as regards the shell, is the extraordinary character of the internal part; which is formed into thirty or forty separate chambers or divisions, each communicating with the rest by a small tubular hole near the centre. The opening or mouth of the shell therefore presents a large but shallow concavity, pierced with a central or nearly central hole; while beyond it lie all the divisions adverted to. The body or chief part of the inhabiting animal fills up the front or great concavity, and that only: while from its extremity proceeds a slender tail or process passing through all the rest of the chambers; and it has been supposed by some that the animal possesses the power of filling up the chambers at pleasure, either with air or water, or of exhausting them of both, in order to make itself specifically heavier or lighter, during its navigations; for this animal is also supposed to have a power of sailing, though in a less perfect manner, than the argonaut or paper-nautilus.

The animal is indistinctly allied (like that of the argonaut) to the sepia or cuttle-fish tribe; having an oval body with the front or central part furnished with a parrot-shaped beak, and surrounded by tentacles or arms; but they differ from those of the sepia in being very short, extremely numerous, disposed in several concentric rows or circles, and not beset with any visible suckers. From above the neck, or round the upper part of the head, rises a large concave flap or hood, beset on the inside with numerous but small suckers, or concave tubercles. By the elevation and expansion of this concave flap or hood the animal of the pearly nautilus is supposed to sail. See Nat. Hist. Pl. CXLIII, CXLIX.

NAVY, the fleet or shipping of a prince or state. (See Marine.)—The management of the British navy, under the lord high admiral of Great Britain, is entrusted to principal officers and commissioners of the navy, who hold their places by patent. The principal officers of the navy are four, viz. the treasurer, whose business it is to receive money out of the exchequer, and to pay all the charges of the navy, by warrant from the principal officers: comptroller, who attends and controls all payment of wages, is to know the rates of stores, to examine and audit all accounts, &c.: surveyor, who is to know the states of all stores, and see wants supplied; to estimate repairs, charge boatswains, &c. with what stores they receive, and at the end of each voyage to state and audit accounts: clerk of the acts, whose business it is to record all orders, contracts, bills, warrants, &c.

The commissioners of the navy are five: the first executes that part of the comptroller's duty which relates to the comptrolling the victualler's accounts; the second, another part of the said comptroller's duty relating to the account of the store-keepers of the yard; the third has the direction of the navy at the port of Portsmouth; the fourth has the same at Chatham; and the fifth at Plymouth. There are also other commissioners at large, the number more or less according to the exigencies of public affairs; and since the increase of the royal navy, these have several clerks under them, with salaries allowed by the king.

The victualling of the royal navy hath formerly been undertaken by contract; but is now managed by commissioners, who hold their office at Somerset-House, in the Strand. The navy-office is where the whole business concerning the navy is managed by the principal officers and commissioners.

The royal navy of Great Britain is now in a very flourishing state, having been diligently kept up in late reigns, as the natural strength of the kingdom. When it is complete it is divided into three squadrons, distinguished by the colours of the flags carried by the respective admirals belonging to the same, viz. red, white, and blue; the principal commander of which bears the title of admiral: and each has under him a vice-admiral and a rear-admiral, who are likewise flag-officers.

In May 1808, the English navy was as follows:

	Ships of the line.
At home, and coming forward	24
Channel fleet	10
North sea, Baltic, and Flushing	14
Coast of Spain and Gibraltar	11
Portugal	9
Mediterranean	19
North America	2
West Indies	12
Brazils, and sailed thither	6
East Indies, Cape, and convoys to St. Helena	9

making, in the whole, 116 ships of the line, which, with 11 fifty-gun ships, constituted a naval force, then actually afloat, superior to

that of the whole world beside. But since that time there has been a considerable augmentation, as will appear from the following statement of the disposition of the British navy in August 1811.

	Lin:	50's	Frig	Slps.	Bm.	Brig.	Cut.	Sch.	Tot.
Downs - - -	1	0	1	14	0	8	5	2	31
North Sea and Baltic - -	22	1	13	24	3	43	7	4	117
English Channel, coast of France	11	1	15	10	0	15	11	9	72
Irish station - -	0	0	4	3	0	0	1	10	18
Jersey, Guernsey, &c. -	0	1	0	0	0	4	2	3	10
Spain, Portugal, and Gibraltar	20	3	17	12	4	20	6	5	96
Mediterranean and on passage	23	0	35	13	0	17	1	3	92
Coast of Africa - -	0	0	1	1	0	0	0	0	2
Halifax and Newfoundland -	1	2	6	11	0	1	1	7	29
Leeward Islands - -	1	0	7	10	0	11	2	11	42
Jamaica, and on passage - -	1	0	7	8	0	12	0	1	29
South America - -	1	0	6	1	0	3	0	0	11
Cape of Good Hope, &c. -	1	0	9	2	0	3	0	0	15
East Indies and on passage -	5	3	21	3	0	4	1	0	37
Total at sea -	96	11	142	112	7	141	37	55	604
In port and fitting - -	20	5	17	26	0	19	3	18	108
Guard ships - - -	5	2	4	5	0	0	0	0	16
Hospital, prison ships, &c. -	30	4	5	0	0	0	0	0	89
Total in commission -	151	22	168	143	7	160	40	73	764
In ordinary and repairing, &c.	69	12	65	47	8	20	0	3	224
Building - - -	34	2	18	2	0	0	0	0	56
Totals - -	254	36	251	192	15	180	40	76	1044

NAY. *ad.* (na, Saxon, or ne aye.) 1. No; an adverb of negation (*Denham*). 2. Not only so, but more: *he is eighteen—nay, twenty-one* (*Ben Jonson*). 3. Word of refusal (*Acts*).

NAYWORD. *s.* (*nay* and *word.*) 1. The saying nay: not in use (*Shakspeare*). 2. Proverbial reproach; a by-word (*Shakspeare*). 3. A watchword: not in use (*Shakspeare*).

NAXIA, or NAXOS, an island of the Archipelago, 15 miles in length and 50 in circumference. It is the most fertile island in all the Archipelago, and its wine still maintains its former excellence. Beside this, its plains abound with orange, olive, lemon, cedar, citron, pomegranate, fig, and mulberry-trees. It is inhabited both by Greeks and Latins, and has a great many villages; but the whole island does not contain above 8000 inhabitants. The highest mountain is Zla, which signifies the mountain of Jupiter: but there are no antiquities, except some small remains of a temple of Bacchus. The female dress in this island has something ridiculous in its appearance. They fix two wings of black velvet behind to their shoulders; and wear a heavy stomacher or breast-piece of velvet, covered with embroidery and small pearls. If viewed behind it is disgusting to see round their loins what, for want of a better name, may be called a circular shelf, calculated to support the ends of a kind of laced lappets hanging down from their shoulders. They paint, blacken their eye-brows and eyelashes, and cover their faces with patches, made of a black shining talc which they find in the island.

NAXIA, the capital of the isle of the same name, and one of the most beautiful places in the Archipelago. It has two archiepiscopal sees, the one Greek and the other Latin. Here is no harbour, but the trade is considerable in barley, wine, oil, figs, cotton, silk, flax, cheese, salt, oxen, sheep, and mules. It stands on the S. side of the island, and is defended by a castle. Lon. 25. 32 E. Lat. 37. 8 N.

NAXKOW, a town of Denmark, capital of the isle of Laland, with a harbour commodious for trade. It is encompassed by a wall, and 70 miles S.W. of Copenhagen. Lon. 11. 31 E. Lat. 54. 52 N.

NAYLER (James), a famous quaker, born in Yorkshire about 1616. He was a soldier in the parliament army; but being converted by George Fox, he commenced preacher, and became popular among the quakers. In 1656 he was committed to prison in Exeter, and while there received a letter from some of the friends, who applied to him the appellations of the prince of peace, and the only begotten son of God. After his release he went to Bristol, where the deluded fanatics ushered him in with the same ceremonies as Christ entered Jerusalem, singing before him, "Holy is the Lord God of Hosts, hosanna in the highest!" For this Nayler was apprehended and sent to London, where he was sentenced to stand in the pillory with a label expressing the nature of his offence, to have his tongue bored through with a hot iron, to be publicly whipped, and branded in the forehead with the letter B. After this he was confined about two years, and on his release in 1660 he set out for Yorkshire, but was robbed and left bound on the road, near King's Rippon, in Huntingdonshire, and died a few days afterwards.

NAYRES, the nobility of the Malabar coast.

NAZARETH, a little city in the tribe of

Zebulun, in Lower Galilee, to the west of Tabor, and to the east of Ptolemais. Eusebius says it is fifteen miles from Legion towards the east. This city is much celebrated in the scriptures for having been the usual place of the residence of Jesus Christ for the first thirty-three years of his life. Luke ii. 51. It was there our Saviour became incarnate, where he lived in obedience to Joseph and Mary, and from whence he took the name of a Nazarean. After he had begun to execute his mission, he preached there sometimes in the synagogue, id. iv. 16. But because his countrymen had no faith in him, and were offended at the meanness of his original, he did not many miracles there, Matth. xiii. 54. 58. nor would he dwell therein; so he fixed his habitation at Capernaum for the latter part of his life, id. iv. 13. The city of Nazareth was situated upon an eminence; and on one side there was a precipice, from whence the Nazareans one day had a design of throwing down our Saviour, because he upbraided them with their incredulity. Luke iv. 29.

St. Epiphanius says, that in his time Nazareth was only a village, and that to the reign of Constantine it was inhabited by Jews alone, exclusive of all Christians. Adamnanus, a writer of the seventh age, says, that in his time there were two great churches to be seen at Nazareth, one in the midst of the city, built upon two arches, in the place where our Saviour's house had stood. Under the two arches now mentioned was a very fine fountain, which furnished water to the whole city, and from whence water was drawn also by the help of a pulley for the use of the church above. The second church of Nazareth was built in a place where the house stood wherein the angel Gabriel revealed to the virgin Mary the mystery of our Lord's incarnation; and we are assured that the church of incarnation, which is supported by two arches, is still in being to this day. Mr. Maundrell tells us, that there is a convent built over what is said to be the place of annunciation; for the chamber where she received the angel's salutation was about 500 years ago removed from Nazareth, and, according to the Roman legends, transported by angels to Loretto.

Nazareth, a town of Pennsylvania, in Northampton county, and a settlement of the Moravians, 10 miles N. of Bethlehem, and 63 N. by W. of Philadelphia.

NAZARITE, or Nazarene, in the Old Testament, is used for a person distinguished and separated from the rest by something extraordinary, either his sanctity, dignity, or vows.

The word comes from the Hebrew נזר *nazar*, to distinguish, separate; in which it differs from Nazarean, an inhabitant of the country called Nazareth, which comes from נצר *natzar*, or *netzer*, to save, preserve.

In the book of Numbers, chap. vi. we find the vow of a Nazarite described, i. e. the vow whereby a man or woman separated themselves to the Lord; and the conditions or effects thereof as to abstinence, &c.

Nazarites, Nazarenes, or Nazareans, were likewise a kind of sectaries in the church in the first ages thereof.

St. Epiphanius tells us, the Nazareans were the same with the Jews in every thing relating to the doctrine and ceremonies of the Old Testament; and only differed from them in this, that they added christianity to those; professing to believe that Jesus Christ was the Messiah.

There were two kinds of Nazareans; the one pure, who kept the law of Moses and christianity together, and who were not placed by the ancient Christians in the register of heretics, but first ranked in this class by Epiphanius in the fourth century; the other, real Ebionites.

Ecclesiastical writers tell us, that St. Matthew preached the gospel to the Jews at Jerusalem, and the rest of Palestine, in their own language; and that accordingly they had his gospel written in the Hebrew of that time. And St. Epiphanius adds, that this gospel was preserved entire among the Nazareans; only he doubts whether they might not have retrenched the genealogy of Jesus Christ, which was not in the copy of the Ebionites. St. Jerom, who translated it out of Hebrew into Greek and Latin, says, a great many people took the Hebrew gospel, used by the Nazareans and Ebionites, to be the original of St. Matthew.

NAZIANZEN. See Gregory (Nazianzen).

NE. *ad.* (Saxon.) Neither; and not (*Spen.*).

NEAF. *s.* (*nefi*, Islandic.) A fist. (*Shakspeare*).

NEAGH (Lough), a lake of Ireland, 20 miles long and 15 broad, lying in the counties of Armagh, Down, Antrim, Londonderry, and Tyrone. The river Bann flows through this lake.

NEAL (Daniel), an English divine and historian, was born in London in 1678, and educated first at Merchant-taylors' school, and then at a dissenting academy kept by Mr. Rowe; after which he went to Utrecht and Leyden. In 1706 he was chosen pastor of a congregation of independents in Aldersgate-street, which afterwards removed to Jewin-street. He wrote a history of New England, 2 vols. 8vo.; a history of the Puritans, 4 vols. 8vo. and some other works. He died in 1743. A new edition of his History of the Puritans has been published by Dr. Toulmin, in 5 vols. 8vo.

To Neal. *v. a.* (onœlan, Saxon.) To temper by a gradual and regulated heat (*Moxon*).

To Neal. *v. n.* To be tempered in fire (*Bacon*).

NEALING OF GLASS. See Glass and Annealing.

NEAP. (neþploð, Saxon; nærpꝛx, poor.) Low; decrescent. Used only of the tide.

Neap, or Neep-tides, are those tides which happen when the moon is in the middle of the second and fourth quarters. The neap-tides are low tides, in respect of their opposites the spring-tides. As the highest of the

spring-tides is three days after the full or change, so the lowest of the neap is four days before the full or change. On which occasion the seamen say that it is deep neap.

NEAPOLIS, a city of Campania, anciently called Parthenope, and now known by the name of Naples. Augustus called it Neapolis. This name was common also to eleven other towns in Asia and Europe.

NEAR. *prep*. (neꞃ, Saxon.) At no great distance from; close to; nigh (*Dryden*).

NEAR. *ad*. 1. Almost (*Drayton*). 2. At hand; not far off (*Dryden*). 3. Within a little (*Bacon*).

NEAR. *a*. 1. Not distant (*Genesis*). 2. Advanced toward the end of an enterprise or disquisition (*Hooker*). 3. Direct; straight (*Milton*). 4. Close; not rambling (*Dryden*). 5. Closely related (*Leviticus*). 6. Intimate; familiar; admitted to confidence (*Shakspeare*). 7. Touching; pressing; affecting; dear (*Shakspeare*). 8. Parsimonious; inclining to covetousness.

NEAR-HAND. Closely (*Bacon*).

NEAR-SIDE of a horse: his left side, or that on which the rider mounts. The horse's right is in like manner called his off-side.

NEARCHUS, an officer of Alexander, who was ordered to sail upon the Indian ocean with Onesicritus, and to examine it. He wrote an account of this voyage, and of the king's life; but his veracity has been called in question by Arrian. After the king's death he was appointed over Lycia and Pamphylia.

NEA'RLY. *ad*. (from *near*.) 1. At no great distance (*Atterbury*). 2. Closely; pressingly (*Swift*). 3. In a niggardly manner.

NE'ARNESS. *s*. (from *near*.) 1. Closeness; not remoteness (*Duppa*). 2. Alliance of blood or affection (*Bacon*). 3. Tendency to avarice (*Bacon*).

NEAT. *s*. (neat, nyten, Saxon.) 1. Black-cattle; oxen (*May*). 2. A cow or ox (*Tusser*).

NEAT. *a*. (*net*, French.) 1. Elegant, but without dignity (*Pope*). 2. Cleanly (*Milton*). 3. Pure; unadulterated; unmingled (*Chapman*).

NEATH, a corporate town of Wales, in Glamorganshire; with a market on Saturday; situate on the river Neath, near the Bristol channel. In the neighbourhood are iron forges, smelting works for copper, and coal mines; and on the other side of the river are the extensive remains of an abbey. A great quantity of coal is exported hence in small vessels. It is 27 miles S.W. of Brecknock, and 198 W. of London.

NEATH, a river of Wales, which rises in Brecknockshire, and runs through Glamorganshire, by the town of Neath, in the Bristol channel.

NE'ATHERD. *s*. (neaꞇꞅyꞃꞇ, Saxon.) A cow-keeper; one who has the care of black-cattle (*Dryden*).

NE'ATLY. *ad*. (from *neat*). 1. Elegantly, but without dignity; sprucely (*Shakspeare*). 2. Cleanlily.

NE'ATNESS. *s*. (from *neat*.) 1. Spruceness; elegance without dignity. 2. Cleanliness.

NEB. *s*. (nebbe, Saxon.) 1. Nose; beak; mouth (*Shakspeare*). 2. (In Scotland.) The bill of a bird.

NEBEL, or NEBEL NASSOR. (Hebrew.) The name given by the ancient Jews to their ten-stringed harp, as that of which David speaks in the Psalms.

NEBO (anc. geog.), a very high mountain, a part of the mountains Abarim, and their highest top, whither Moses was ordered to ascend to take a view of the land of Canaan, and there die. Situated in the land of Moab, over-against Jericho: with a cognominal town at its foot (Isaiah) belonging to the Rubenites, which afterwards returned to the Moabites; in Jerom's time desolate: eight miles to the south of Heshbon.

NEBULÆ, in astronomy. There are spots in the heavens called nebulæ, some of which consist of clusters of telescopic stars, others appear as luminous spots of different forms. The most considerable is one in the midway between the two stars on the blade of Orion's sword, marked θ by Bayer, discovered in the year 1656 by Huygens; it contains only seven stars, and the other part is a bright spot upon a dark ground, and appears like an opening into brighter regions beyond.

Dr. Halley and others have discovered nebulæ in different parts of the heavens. In the Connoissance des Temps, for 1783 and 1784, there is a catalogue of 103 nebulæ, observed by Messier and Mechain. But to Dr. Herschel we are indebted for catalogues of 2000 nebulæ, and clusters of stars, which he himself has discovered. Some of them form a round compact system, others are more irregular, of various forms, and some are long and narrow. The globular systems of stars appear thicker in the middle than they would do if the stars were all at equal distances from each other; they are, therefore, condensed toward the centre. That stars should be thus accidentally disposed is too improbable a supposition to be admitted; he supposes, therefore, that they are brought together by their mutual attractions, and that the gradual condensation towards the centre is a proof of a central power of such a kind. He observes, also, that there are some additional circumstances in the appearance of extended clusters and nebulæ, that very much favour the idea of a power lodged in the brightest part. For although the form of them be not globular, it is plain that there is a tendency to sphericity. As the stars in the same nebulæ must be very nearly all at the same relative distances from us, and they appear nearly of the same size, their real magnitudes must be nearly equal. Granting, therefore, that these nebulæ and clusters of stars are formed by mutual attraction, Dr. Herschel concludes, that we may judge of their relative age by the disposition of their component parts, those being the oldest which are most compressed. He

supposes, and indeed offers powerful arguments to prove, that the milky way is the nebulæ of which our sun is one of its component parts.

Dr. Herschel has also discovered other phenomena in the heavens, which he calls nebulous stars; that is, stars surrounded with a faint luminous atmosphere of large extent. Those which have been thus styled by other astronomers, he says, ought not to have been so called, for on examination they have proved to be either mere clusters of stars plainly to be distinguished by his large telescopes, or such nebulous appearances as might be occasioned by a multitude of stars at a vast distance. The milky way consists entirely of stars; and he says, "I have been led on by degrees from the most evident congeries of stars to other groups in which the lucid points were smaller, but still very plainly to be seen; and from them to such wherein they could but barely be suspected, until I arrived at last to spots in which no trace of a star was to be discerned. But then the gradation to these latter were by such connected steps as left no room for doubt, but that all these phenomena were equally occasioned by stars variously dispersed in the immense expanse of the universe."

In the same paper is given an account of some nebulous stars, one of which is thus described: "Nov. 13, 1790. A most singular phenomenon! A star of the eighth magnitude, with a faint luminous atmosphere of a circular form, and of about three in diameter. The star is perfectly in the centre, and the atmosphere is so diluted, faint, and equal throughout, that there can be no surmise of its consisting of stars, nor can there be a doubt of the evident connection between the atmosphere and the star. Another star, not much less in brightness, and in the same field of view with the above, was perfectly free from any such appearance." Hence, Dr. Herschel draws the following consequences: granting the connection between the star and the surrounding nebulosity, if it consist of stars very remote, which gives the nebulous appearance, the central star, which is visible, must be immensely greater than the rest; or if the central star be no bigger than common, how extremely small and compressed must be those other luminous points which occasion the nebulosity. As, by the former supposition, the luminous central point must far exceed the standard of what we call a star; so in the latter, the shining matter about the centre will be too small to come under the same denomination; we, therefore, either have a central body which is not a star, or a star which is involved in a shining fluid, of a nature totally unknown to us. This last opinion Dr. Herschel adopts.

Light reflected from the star could not be seen at this distance. Besides, the outward parts are nearly as bright as those near the star. Moreover, a cluster of stars will not so completely account for the mildness or soft tint of the light of these nebulæ, as a self luminous fluid. "What a field of novelty," says Dr. Herschel, "is here opened to our conceptions! A shining fluid, of a brightness sufficient to reach us from the regions of a star of the 8th, 9th, 10th, 11th, 12th, magnitude; and of an extent so considerable as to take up 3, 4, 5, or 6 minutes in diameter." He conjectures that this shining fluid may be composed of the light perpetually emitted from millions of stars. See Philos. Trans. vol. lxxxi. p. 1. on nebulous stars, properly so called.

NEBULY, or Nebulee, in heraldry, is when a coat is charged with several little figures, in form of words running with one another, or when the outline of a bordure, ordinary, &c. is indented or waved.

NEBULOUS. *a.* (*nebulosus*, Latin.) Misty; cloudy.)

NECESSARIES. *s.* (from *necessary*) Things not only convenient but needful (*Hammond*)

NECESSARILY. *ad.* (from *necessary*.) 1. Indispensably (*Hooker*). 2. By inevitable consequence (*Hooker*). 3. By fate; not freely (*Southey*).

NECESSARINESS. *s.* (from *necessary*.) The state of being necessary.

NECESSARY. *a.* (*necessarius*, Latin.) 1. Needful; indispensably requisite (*Tillot.*). 2. Not free; fatal; impelled by fate (*Shakspeare*). 3. Conclusive; decisive by inevitable consequence (*Tillotson*).

Necessary polygamy. In botany, polygamia necessaria. The name of the fourth order in the class syngenesia; wherein the hermaphrodite florets of the disk, for want of a stigma, are barren; but the female florets of the ray, being impregnated by the pollen from the others, bear perfect seed.

To NECESSITATE. *v. a.* (from *necessitas*, Lat.) To make necessary; not to leave free: to exempt from choice (*Duppa*).

NECESSITATION. *s.* (from *necessitate*.) The act of making necessary; fatal compulsion (*Bramhall*).

NECESSITED. *a.* (from *necessity*). In a state of want: not used (*Shakspeare*).

NECESSITOUS. *a.* (from *necessity*.) Pressed with poverty (*Clarendon*).

NECESSITOUSNESS. *s.* (from *necessitous*.) Poverty; want; need (*Burnet*).

NECESSITUDE. *s.* (*necessitudo*, Latin,) 1. Want; need (*Hale*). 2. Friendship.

NECESSITY. *s.* (*necessitas*, Latin.) 1. Cogency; compulsion; fatality (*Milton*). 2. State of being necessary; indispensableness (*Shakspeare*). 3. Want; need; poverty (*Clarendon*). 4. Things necessary for human life (*Shakspeare*). 5. Cogency of argument; inevitable consequence (*Raleigh*). 6. Violence; compulsion (*Chapman*).

Necessity, in mythology, a power superior to all other powers, and equally irresistible by gods and by men. Herodotus, as he is quoted by Cudworth, mentions an oracle which declared that God himself could not shun his destined fate. And among the fragments of Philemon collected by Le Clerc is the following sentence:

Δουλοι βασιλεων εσμεν, δι βασιλεις θεων, ὁ θεος αναγκης.

"We are subject to kings, kings to the gods, and God to necessity." Hence it is, that, in the Iliad, we find Jove himself, the sire of gods and men, regretting that he was restrained by Necessity from rescuing his favourite son from the sword of Patroclus. Nay, to such a height was this impiety carried in the earliest ages of Greece, that we find Hesiod and Homer teaching that the gods themselves were generated by Necessity, of Night and Chaos.

This power, though always represented as blind and unintelligent, was however worshipped as a goddess, bearing in her hand large iron-nails, wedges, anchors, and melted lead, as emblems of the inflexible severity of her nature. In the city of Corinth she had a temple, in which the goddess Violence likewise resided, and into which no person was ever permitted to enter but the priest who officiated *in sacris*.

NECESSITY (Metaphysical or philosophical,) is a term that has been much used by modern writers; and which some have defined to be, that by which a thing cannot but be, or whereby it cannot be otherwise. But a much approved author on this subject objects against this definition, and observes, that philosophical necessity is really nothing else than the full and fixed connection between the things signified by the subject and predicate of a proposition, which affirms something to be true; so that it is in no respect different from their certainty. When there is such a connection, then the thing affirmed in the proposition is necessary in a philosophical sense; whether any opposition or contrary effort be supposed or supposable in the case or no. When the subject and predicate of the proposition, which affirms the existence of any thing, either substance, quality, act, or circumstance, have a full and certain connection, then the existence of that thing is said to be necessary in a metaphysical sense.

Those that are commonly called Necessarians allow no other liberty to man that is not restrained by this kind of necessity: and when they consider intelligent beings as the subjects of it, some of them distinguish it into moral and natural necessity. Moral necessity is used in a variety of senses: sometimes for a necessity of moral obligation; and often for great obligation in point of interest: sometimes by moral necessity is meant that apparent connection of things, which is the ground of moral evidence; and so it is distinguished from absolute necessity, or that sure connection of things that is a foundation for infallible certainty: and sometimes by moral necessity is meant that necessity of connection and consequence which arises from such moral causes, as the strength of inclination or motives, and the connection, subsisting in many cases, between these and certain volitions and actions. By natural necessity, as applied to men, they understand such necessity as men are under, through the force of natural causes; in contradistinction to those that are called moral causes, such as habits and dispositions of the heart, and moral inducements and motives.

Mr. Hobbes, who is said to have been the first who understood and maintained the proper doctrine of philosophical necessity, gives the following account of it in his Leviathan, p. 108. Liberty and necessity are consistent: as in the water, that hath not the liberty, but a necessity of descending in the channel; so likewise in the actions which men voluntarily do, which, because they proceed from their will, proceed from liberty; and yet, because every act of man's will, and every desire and inclination, proceedeth from some cause, and that from another cause, in a continual chain (whose first link is in the hand of God, the first of all causes), proceed from necessity: so that to him who could see the connection of those causes, the necessity of all men's voluntary actions would appear manifest: and, therefore, God, that seeth and disposeth all things, seeth also that the liberty of man, in doing what he will, is accompanied with the necessity of doing that which God will, and no more or less: for though men may do many things which God does not command, nor is, therefore, the author of them, yet they can have no passion, will, or appetite to any thing, of which appetite God's will is not the cause: and did not his will assume the necessity of man's will, and consequently of all that on man's will dependeth, the liberty of men would be a contradiction and impediment to the omnipotence and liberty of God.

Mr. Collins, one of the most admired writers on the subject of necessity, has stated the question concerning human liberty in the following manner: Man, he says, is a necessary agent, if all his actions are so determined by the causes preceding each action, that not one past action could possibly not have come to pass, or have been otherwise than it hath been; nor one future action can possibly not come to pass, or be otherwise than it shall be. But he is a free agent, if he is able, at any time, under the circumstances and causes he then is, to do different things; or, in other words, if he is not unavoidably determined, in every point of time, by the circumstances he is in, and causes he is under, to do that one thing he does, and not possibly to do any other. According to this state of the question, he undertakes to prove that man is a necessary agent; and that there neither is nor can be such thing as liberty. 1. He appeals to experience; alleging, that, though the vulgar urge this in proof of liberty, it is not a proof of it: that many celebrated philosophers and theologers, both ancient and modern, have given definitions of liberty that are consistent with fate or necessity: that some great patrons of liberty do, by their concessions in this matter, destroy all arguments from experience: that all the actions of men may be ranked under the four heads of perception, judging, willing, and doing as we will; and that experience does no prove any of these to be free; and that experience not only does not prove liberty, but, on the contrary, men may see by experience, that

they are necessary agents. It is, says he, matter of experience, that man is ever determined in his willing; we experience perfect necessity; and they, who think liberty a matter of experience, yet allow that the will follows the judgment of the understanding, and that, when two objects are presented to a man's choice, one whereof appears better than the other, he cannot choose the worst. 2. Man is a necessary agent, because all his actions have a beginning; for whatever has a beginning must have a cause, and every cause is a necessary cause: and if any action whatsoever can be done without a cause, then effects and causes have no necessary relation; and, consequently, we should not be necessarily determined in any case at all. 3. Liberty would not be a perfection, but an imperfection; whereas, on the contrary, necessity is an advantage and a perfection. 4. Liberty is inconsistent with the divine prescience; for if God foreknows the existence of any thing, as it depends on its own causes, that existence is no less necessary than if it were the effect of his decree: for it no less implies a contradiction, that causes should not produce their effects, than that an event should not come to pass which is decreed by God.

This argument for necessity has been urged by a variety of writers; and the advocates for liberty have felt its force, and endeavoured to obviate it. Some have actually given up the divine prescience: some have allowed the seeming contradiction implied in the foreknowledge of a contingent event, and have acknowledged themselves incapable of removing it: others have endeavoured to reconcile the foreknowledge of God and the liberty of man, by alleging, that there is a great difference between God's foreknowledge and his decrees, with regard to the necessity of future events; for God's prescience has no influence at all on our actions: his infallible judgment, concerning contingent truths, does no more alter the nature of the things, and cause them to be necessary, than our judging right, at any time, concerning a contingent truth, makes it cease to be contingent; or, than our sense of a present truth is any cause of its being true or present.

In the argument, says Dr. Clarke, drawn against liberty from the divine prescience, it must not first be supposed that things are in their own nature necessary; but from the divine prescience or power of judging infallibly (which power is as much more extensive and infallible than in man, as the divine nature and understanding are superior to ours) concerning free events, it must be proved, that things otherwise supposed free, will, therefore, unavoidably become necessary; which can no more be proved, than it can be proved that an action, supposed at this present time to be free, is yet (contrary to the supposition) at the same time necessary; because, in all past time, whether foreknown or not foreknown, it could not, upon that very supposition of its being now freely done, but be future.

In another place he acknowledges, that though it is impossible for us to explain distinctly the manner how God can foresee future events without a chain of necessary causes, yet we may form some general notion of it. For as a man who has no influence over another person's actions, and yet often perceives beforehand what that other will do; and a wiser and more experienced man will still, with greater probability, foresee what another, whose disposition he is perfectly acquainted with, will in certain circumstances do; and an angel, with still much less degree of error, may have a farther prospect into men's future actions: so it is very reasonable to apprehend that God, without influencing men's wills by his power, yet by his foresight cannot but have as much more certain a knowledge of future free events than either men or angels can possibly have, as the perfection of his nature is greater than that of theirs. The certainty of foreknowledge, says this excellent writer, does not cause the certainty of things, but is itself founded on the reality of their existence; nor does it imply any other certainty than such as would be equally in things, though there was no foreknowledge; nor again does this certainty of event, in any sort, imply necessity. To the same purpose Origen has long ago observed, that prescience is not the cause of things future, but their being future is the cause of God's prescience that they will be.

It cannot reasonably be disputed that there is an essential difference between the foreknowledge and permission of events, and the preordination and production of them; and the scheme of necessity seems directly to charge God with being the efficient cause or author of those vices and evils, which arise from circumstances and connexions of his previous and absolute appointment. Indeed, many of the advocates of this scheme will not admit the consequence that seems to be fairly deducible from their opinion: however, Dr. Priestley very candidly allows it.

Another argument in favour of necessity has been deduced from the nature of morality: for if a man was not a necessary agent, determined by pleasure and pain, he would have no notion of morality, or motive to practise it; and if he were indifferent to pleasure and pain, he would have no rule to go by, and might never judge, will, and practise right. Every act of the will, it is said, is excited by some motive, which motive is the cause of that act: and if volitions are properly the effects of motives, then they are necessarily connected with their motives: whence it is inferred, that volition is necessary, and doth not proceed from any self-determining power in the will. This argument has been illustrated and urged in all its force by many modern writers, from M. Leibnitz to Dr. Priestley, the last and most zealous advocate for necessity: and it has often been answered by Dr. Clarke and others, who have strenuously maintained that liberty is perfectly consistent with men's acting from a regard to motives.

Supposing, says Dr. Price, a power of self-determination to exist, it is by no means necessary that it should be exerted without a regard to any end or rule; on the contrary, it can never be exerted without some view or design. Whoever acts means to do somewhat. The power of determining ourselves, by the very nature of it, wants an end or rule to guide it; and no probability or certainty of its being exerted agreeably to a rule can have the least tendency to infringe or diminish it. All that should be avoided here is the intolerable absurdity of making our reasons and ends in acting the physical causes or efficients of action. This is the same with ascribing the action of walking not to the feet, or the power which moves the feet, but to the eye, which only sees the way. The perception of a reason for acting, or the judgment of the understanding, is no more than seeing the way; it is the eye of the mind which informs and directs; and whatever certainty there may be that a particular determination will follow, such determination will be the self-determination of the mind; and not any change of its state stamped upon it, over which it has no power, and in receiving which, instead of being an agent, it is merely a passive subject of agency. Although the views and ideas of beings may be the occasions of their acting; yet it is a contradiction to make them the mechanical efficients of their actions: so necessary and important is the distinction insisted upon by Dr. Clarke, between the operation of physical causes and the influence of moral reasons.

The celebrated Mr. Dawson of Sedbergh published, in the year 1781, a pamphlet entitled "The Doctrine of Philosophical Necessity briefly invalidated:" the mode of argument adopted in this publication may be understood from the following concise view of it.

Mr. Dawson, observing that in all sciences some principles must be taken for granted, else nothing can be proved, premises these three axioms.

1st. If we make a false supposition, and reason justly from it, a contradiction or absurdity will be contained in the conclusion.

2d. It must likewise be taken for granted (as it does not admit of proof), that every action, or exertion, voluntarily made, is with a design, or in hopes of obtaining some end. For it is evident, that where there is a full conviction of the impossibility of this, no rational being will make any attempt or exertion at all.

3d. All practical principles must either be founded in truth, or believed to be so for the moment that they operate.

These axioms being admitted, this author first supposes the doctrine of necessity to be true, and that its truth is discovered to us in such a manner, and is so strongly impressed upon our minds, as to become a practical principle; then upon this supposition he concludes, by the second axiom, that motives of all kinds must cease to operate.

To illustrate this, he takes an event in which we are all equally concerned, viz. the time and circumstances of our death. Supposing, therefore, that at or before our entrance into this world the time of our leaving it was fixed, and that we actually believed it to be so, no circumstance throughout life, no possible situation in which we could be placed, would operate as a motive, so as to make us use even the slightest endeavour either to lengthen out or shorten the period of our existence. This must be allowed, upon the supposition under consideration; and if this be the case, with regard to so momentous an event, it will certainly hold true of any other. Hence, he observes, this conclusion may be fairly drawn,—that where the doctrine of necessity is firmly believed, and made use of as a practical principle, motives cease to operate. But upon the certain and infallible operation of motives the whole scheme of necessity is founded: this doctrine, therefore, taken in this light, is destructive of itself.

In the next place he supposes the doctrine of necessity to be true, but that it does not (as we find is really the case) operate as a practical principle, and then proceeds to examine the consequence.

A practical principle, he observes, for the instant that it operates, must be seen or felt to be speculatively true, else it could not answer the end intended. For, a full conviction of its being false, at the very time it ought to influence our conduct, would certainly destroy its effect. This cannot be denied. Examples in real life might be found in abundance to illustrate this supposition. We daily see errors in opinion (or of prejudice) made the foundation of our practice, which, when our minds are better informed, cease to operate, and give place to the opposite truths; or, in other words, the moment that the error of any practical principle is discovered, and in such a manner as to present itself to us upon every occasion, it will cease to operate, and the opposite truth will instantly take possession, as it were, and influence our conduct accordingly. He supposes, likewise, that in a future state our faculties will be enlarged, our understandings enlightened, and our apprehensions quickened in such a degree, that the truths which we now attain to with difficulty and much study will then appear as axioms, or be classed among the first principles of our knowledge, and hence serve as a basis for making farther discoveries by reason. If therefore, as was before supposed, philosophical necessity be a truth, and likewise discoverable by human reason; in some future period of our existence, liberty, as opposed to this truth, must cease to operate as a practical principle, and give place to ideas of necessity, which, like all intuitive truths, will ever be present to the mind, and consequently, as has been proved before, reduce us to a state entirely torpid.

Here then is discovered a barrier or limit, to which human nature in its progress in knowledge can never arrive; and which the subtile metaphysician, by standing on tiptoe, has already got a sight of. Must we then, as Mr. D. observes, in a future state be under the disagreeable necessity of petitioning the Deity to darken our understandings, and blunt our pe-

netration, in order that we may enjoy the greater happiness? Common sense revolts from such an idea.

NECHO, king of Egypt, began his reign 690 B. C. and was killed eight years after by Sabacon, king of Ethiopia. Psammeticus his son succeeded him, and was the father, as Herodotus informs us, of Necho II. who reigned in the 616 B. C. This Necho II. is celebrated in history for attempting, though in vain, to cut a canal from the Nile to the Arabian gulf. He carried his arms as far as the Euphrates, and conquered the city of Carchemish. This prince is not only known in scripture under the name of Necho, but also in profane history. He no sooner succeeded to the crown than he raised great land armies, and fitted out vast fleets, as well upon the Mediterranean as upon the Red sea: he gave battle to the Syrians near the city of Migdol; routed them, and made himself master of the city of Cadytis. The learned, however, are not agreed about this city of Cadytis. Some will have it to be Cades in Arabia Petræa, others Jerusalem; and others say it is the city of Cedes, or Kedesh, in Galilee, in the tribe of Naphtali. The scriptures acquaint us with the whole expedition of Necho in all its particulars; 2 Kings xxiii. 29, &c. and 2 Chr. xxxv. 20, 21, &c.

NECK. *s.* (hneca, Saxon; *neck*, Dutch). 1. The part between the head and body (*Addison*). 2. A long narrow part (*Bacon*). 3. *On the neck*; immediately after (*Shakspeare*). 4. *To break the neck* of an affair; to hinder any thing being done; or, to do more than half.

Neck, (*collum.*) In anatomy. The parts which form the neck are divided into external and internal. The external parts are the common integuments, several muscles, eight pair of cervical nerves, the eighth pair of nerves of the cerebrum, and the great intercostal nerve, the two carotid arteries, the two external jugular veins, and the two internal, the glands of the neck, viz. the jugular, submaxillary, cervical, and thyroid. The internal parts are the fauces, pharynx, œsophagus, larynx, and trachea. The bones of the neck are the seven cervical vertebræ.

Neck. (*collum*). In botany, the upper part of the tube in a corol of one petal.

Neck, in music, that part of a violin, guitar, &c. which extends from the head to the body, and on which the finger-board is fixed.

Neck (John Van), a Dutch painter, born at Naarden in 1635. He excelled in designing naked figures; but his capital performance is a picture representing Simeon with Christ in his arms, in a church at Amsterdam. He died in 1714.

NECKARS-GEMUND, a town of Germany, in the palatinate of the Rhine, seated on the Neckar, 42 miles N. of Stutgard. Lon. 9. 55 E. Lat. 49. 26 N.

Neckars-Ulm, a town of Germany, in the circle of Franconia, seated on the Neckar. It belongs to the grand-master of the Teutonic order. Lon. 9. 5 E. Lat. 49. 52 N.

NE'CKBEEF. *s.* (*neck* and *beef.*) The coarse flesh of the neck of cattle (*Swift*).

NE'CKCLOTH. *s.* (*neck* and *cloth.*) That which men wear on their neck (*Gay*).

NECKERA, in botany, a genus of the class cryptogamia, order musci. Capsule oblong; fringe double; outer of sixteen acute teeth; inner of sixteen filiform teeth, distinct, alternating with the outer ones; flowers lateral. Fourteen species; of which five are indigenous to our own country.

NE'CKERCHIEF. Ne'ckatee. *s.* A gorget; handkerchief for a woman's neck.

NE'CKLACE. *s.* (*neck* and *lace.*) An ornamental string of beads or precious stones, worn by women on their neck (*Arbuthnot*).

NE'CKWEED. *s.* (*neck* and *weed.*) Hemp: in ridicule.

NECROLOGY. (*necrologium*, formed of νεκρος, dead, and λογος, discourse or remuneration). A book anciently kept in churches and monasteries; wherein were registered the benefactors to the same, the time of their deaths, and the days of their commemoration; as also the deaths of the priors, abbots, religious, canons, &c.

This was otherwise called calendar and obituary.

NE'CROMANCER. *s.* (νεκρος and μαντις.) One who by charms can converse with the ghosts of the dead; a conjurer (*Swift*).

NECROMANCY. (*necrologium*, formed from νεκρος, dead, and μαντεια, inchantment or divination.) The art or act of communicating with devils, and doing surprising feats by their assistance; particularly of calling up the dead, and extorting answers from them. See Magic, Divination, &c.

NECROPOLIS, a suburb of Alexandria in Egypt. It signifies "the City of the Dead;" wherein there were temples, gardens, and superb mausoleums. Here Cleopatra is said to have applied the aspic to her breast, to prevent being led in triumph by Augustus, who endeavoured to save her.

NECROSIS. (*necrosis*, νεκρωσις, from νεκροω, to destroy). The dry gangrene. A species of mortification, in which the parts become dry, insensible, and black, without any previous inflammation.

NECTANEBUS and Nectanabis, a king of Egypt, who defended his country against the Persians, and was succeeded by Tachos, B. C. 363. His grandson, of the same name, made an alliance with Agesilaus, king of Sparta, and with his assistance he quelled a rebellion of his subjects. Sometime afterward he was joined by the Sidonians, Phœnicians, and inhabitants of Cyprus, who had revolted from the king of Persia. This powerful confederacy was soon attacked by Darius, the king of Persia, who marched at the head of his troops. Nectanebus, to defend his frontiers, levied 20,000 mercenary soldiers in Greece, the same number in Libya, and 60,000 were furnished in Egypt. This numerous body was not equal to the Persian forces, and Nectanebus, defeated

in a battle, fled into Æthiopia, B. C. 350. Egypt became from that time tributary to the king of Persia.

NECTAR, among ancient poets, the drink of the fabulous deities of the heathens; in contradistinction from their solid food, which was called ambrosia.

NE'CTARED. *a.* (from *nectar.*) Tinged with nectar; mingled with nectar (*Milton*).

NECTA'REOUS. *a.* (*nectareus*, Latin.) Resembling nectar; sweet as nectar (*Pope*).

NE'CTARINE. *a.* (from *nectar.*) Sweet as nectar (*Milton*).

NECTARINE, in botany. See AMYGDALUS.

NECTARIUM, or NECTARY, the melliferous part of a vegetable, peculiar to the flower. It commonly makes a part of the corol, but is sometimes entirely distinct from it, and is then called a proper nectary. It is frequently in form of a horn or spur: sometimes it takes the shape of a cup, whence this part is named in English by some the honey cup.

NECTRIS, in botany, a genus of the class hexandria, order digynia. Calyx six-parted, the three inner divisions less and obtuse; corolless; capsules two, somewhat fleshy, crowned with the styles, one-celled, many-seeded. One species, a native of Guiana and Cayenne, with leaves opposite in many capillary divisions, and yellow flowers.

NECYDALIS. Carrion-eater. In zoology, a genus of the class insecta, order coleoptera. Antennas setaceous, or filiform; feelers four, filiform; shells less than the wings, and either narrower or shorter than the abdomen; tail simple. Thirty-nine species, chiefly natives of Europe; a few of Australasia; one or two of Africa, and of America: seven common to our own country. They may be thus subdivided.

A. Antennas setaceous; shells shorter than the wings and abdomen: four species, comprising the molorchus tribe of Fabricius.

B. Antennas filiform; shells subulate, as long as the body. Thirty-five species; comprising the necydalis tribe of Fabricius

This genus is generally found in the woods, in the perfect form; but the residence and character of the larves are unknown. In some individuals the thorax is black, in others yellow; the elytra or wing-sheaths are generally black, and lighter towards the middle, which contains a lemon-coloured spot.

NEED. *s.* (neoꝺ, Saxon; *nood*, Dutch.) 1. Exigency; pressing difficulty; necessity. 2. Want; distressful poverty (*Shakspeare*). 3. Want; lack of any thing for use (*Baker*).

To NEED. *v. a.* To want; to lack, to be in want of; to require (*Locke*).

To NEED. *v. n.* 1. To be wanted; to be necessary (*Spenser*). 2. To have necessity of any thing; to be in want of any thing (*Locke*).

NEE'DER. *s.* (from *need.*) One that wants any thing (*Shakspeare*).

NEE'DFUL. *a.* (*need* and *full.*) Necessary; indispensably requisite (*Addison*).

NEE'DFULLY. *ad.* Necessarily (*Ben Jonson*).

NEE'DFULNESS. *s.* Necessity.

NEEDHAM (Marchamont), a satirical English writer, was born at Benford in Oxfordshire in 1620, and educated at All Souls college, Oxford. He afterwards became a lawyer's clerk in London, and at length turned physician. In the civil war he distinguished himself by his political writings, first against the parliament, and afterwards against monarchy. At the restoration he obtained his pardon with difficulty, after which he exercised physic among the dissenters. He died in 1678. His principal performances were a kind of newspapers called Mercuries, as the Mercurius Britannicus, Mercurius Pragmatius, and Mercurius Politicus.

NEEDHAM (John Tuberville), a Roman catholic divine, was born at London in 1713, and educated at Douay, where he entered into orders. His superiors appointed him professor of philosophy in the English college at Lisbon. He afterwards became travelling tutor to a nobleman; and, finally, settled in London, where he was chosen fellow of the Royal Society. He died in 1781. He wrote several papers on experimental philosophy in the Philosophical Transactions.

NEEDHAM, a town in Suffolk, with a market on Wednesday. It has some trade in Suffolk-blues, and cloths; and women are employed in spinning and weaving bonelace. It is seated on the Orwell, 10 miles N.W. of Ipswich, and 73 N.E. of London. Lon. 1. 23 E. Lat. 52. 15 N.

NEE'DILY. *ad.* (from *needy.*) In poverty; poorly.

NEE'DINESS. *s.* (from *needy.*) Want; poverty (*Bacon*).

NEEDLE. A name given to various small instruments in the useful arts. The most common acceptation of the word is to denote the common sewing-needle, which is so well known as to require no description: beside this there is the knitting-needle; the netting-needle; the glovers needle, with a triangular point; the tambour-needle, which is made like a hook and fixed in a handle; the hook being thrust through the cloth, the thread is caught under the hook, and the needle is drawn back, taking the thread with it. Needle is a name given to a part of the stocking-frame, lace machine, and many other machines in the manufactures.

Manufacture of sewing needles.—The immense demand for these small articles, rather than any difficulty there is in making them, has introduced a system in their manufacture by which they can be produced at an exceeding low price, considering the number of processes it is requisite for a needle to pass through before it can be finished. Needles are made from steel-wire; formerly German steel was used, as it is still for common articles, but for finer kinds cast steel is employed. German steel is made by cutting a bar of common steel (in the state it comes from the steel furnace) into pieces, which are laid together, to form what is called a faggot, and these pieces are welded together under a tilt hammer. This kind, which is also called

shear steel, is very tough, and rather of a fibrous texture, the parts being well incorporated together by the process of welding. Cast steel is made by melting common steel and casting it into ingots, which are hammered out into bars, under the tilt hammer: this kind of steel, which has been generally introduced of late years, is so perfectly homogenous, in consequence of the melting, that it is much better adapted for bearing the fine point requisite for a needle. The steel is formed into wire by repeatedly drawing it through holes in a piece of steel plate; every time it is drawn it is reduced in a small degree, until it is of the size to form the needles required: the wire-drawing is a distinct trade from the needle-making, and is now performed by machinery. The wire when drawn to the proper size, which is ascertained by gages, is made up into coils for package; these coils of wire are heated to a dull red in a furnace, and suffered to cool gradually, to soften and anneal it, with a view to facilitate the working of the steel, which commences by cutting the wire into lengths: it is done by a pair of shears in the manner shewn at fig. 1. of plate 121. The workman being seated before a bench upon which the shears are fixed, takes a great number of pieces of wire for fine needles, as many as 100, and introducing their ends between the blades *a*, *b*, which he opens with his right hand, he presses the ends of the wire up against the gage *c*, which regulates them to be all of one length; then cutting them all off, they drop down into the tin pan *d* placed on a small shelf in front of the bench: the ends of the wire are now pressed against the gage, and cut off again. In this manner the wire is with surprising expedition cut into lengths proper for making needles.

The second operation is flatting the end intended to become the eye of the needle, and piercing it. This is done as represented in fig. 2, by a workman taking three or four between his finger and thumb; holding them rather diverging, he places them successively on a small anvil, A, and striking one blow upon each, expands the end sufficiently to receive the point of the punch which pierces the eye: this the same person does (before he lays them down) by a small instrument B, fixed on the same block as the anvil: it is shewn (enlarged) in fig. 3, to consist of an iron frame *b*, which has sockets fixed to it to guide a square sliding bar *d*, having the punch fixed into the lower end of it, and is struck upon the upper end by the hammer. The end of the needle is placed in a small notch in the bed *e* of the instrument, and is then put exactly beneath the punch, and a slight stroke of the hammer punches the eye, and at the same time forms the semicircular groove near the eye of the needle to bury the thread. This groove is shewn in the magnified figure of a needle at X fig. 4, and the form of the punch is shewn at Y; the point *y* is for piercing out the eye, and the edge *z* for sinking the groove above mentioned, which may be readily discerned in a needle by a magnifying glass, or in a large needle by the naked eye. The notch which receives the needle is made in a piece of steel, shewn enlarged at *z*, which fits into a dovetailed notch in the bed of the instrument, so that it can be changed for a larger or smaller, correspondent to the size of the needles to be pierced. The workman holds the needles in the same manner as he did for flatting; and placing them one by one successively in the notch in the bed-piece, pierces them, by striking a single blow of his hammer on the end of the slider *d*: the slider is immediately returned by a spring *g*. He now places the next needle under the punch, and when they are all pierced in this manner, he rolls them over by moving his thumb, so as to turn them all half round, and bring upwards the opposite side to that which was pierced: this being done he repeats the punching on the other side with a view to finish, and clear the eye, and to form the groove before described on both sides.

The needles are now rounded at the eye-end, to take off the roughness; it is done by applying them for an instant against a grindstone.

The next process is hardening and tempering, upon which a great part of the perfection of the needle depends. Hardening is done by placing a great number together upon a piece of iron, bent up at the ends and sides that they may not roll off, and introducing them into a small furnace: when they become of a fair red heat they are taken out, and suddenly plunged into a vessel of cold water; this renders them hard: some manufacturers, instead of water, use oil to cool them, or tallow mixed with oil, and various other ingredients, which are supposed to improve the process. The needles thus hardened are returned to the furnace with the oil upon them, and remain there till the oil flames, when they are withdrawn, and again cooled in cold water. This second process tempers them: at first they were quite hard, and so brittle as to break with the slightest touch; the tempering takes off this brittleness, but leaves them sufficiently hard to take a good point. When they are hardened in water, according to the old method, the heat for tempering can only be estimated; but the flaming of the oil is a much more certain method.

The needles are now examined, and many are found crooked by the process of hardening; these are discovered by rolling them over as they lay in rows on a board, and such are selected and straightened by a slight blow, laying them in a notch in an anvil. Being thus straightened they require to be pointed, which is done by large grindstones turned by mills, either water or steam, as the convenience of the manufactory admits; a mill of this kind is explained under our article BLADE-MILL. The grindstone, *a*, fig. 5, is from 2 ft. to 4 ft. in diameter, and from 4 to 6 inches broad: the workman is seated astride before the stone, on a block B, shaped like a saddle; he takes up 20 or 30 needles (see fig. 6.), laid side by side across a small wooden ruler *a*, covered with soft leather; another similar ruler *b* is laid over the needles to confine them: the workman

holds the ruler, *a*, in one hand, and *b* in the other; and applies the point *c*, which projects over the rulers to the grindstone, as shewn in fig. 5: at the same time, by drawing the sticks *a* and *b* over one another he rolls the needles, turning each round upon its own axis while it is grinding, so as to form a neat conical point: by this simple contrivance they are pointed with incredible expedition, and very accurately.

After pointing, the needles are polished in the following manner: a great number of the same sized needles are laid side by side, in a row of many thicknesses, upon a long slip of buckram, dusted over with fine emery powder, which is also sprinkled upon the needles; a small quantity of oil is now dropped upon the needles, and the buckram is rolled up with the needles in it, so as to form a roll, which is wrapped in another buckram, and bound with twine, the ends being secured to prevent the needles getting out. Two or more of these rolls, each containing from 10 to 20 thousand needles, are placed in the polishing machine, fig. 7, which consists of a strong table, A, upon which the rolls *a a* are laid, and over them is placed a box, B, loaded with weights, which is moved backwards and forwards, and rolls the needles in the manner of a mangle: the box is moved by two levers, CC, centered to a block fixed to the ceiling, and to these one end of a spear rod, D, is jointed, and receives its movement at the other end, from a crank worked by the same mill which turns the grindstones. The operation of this machine is to compress the rolls successively on all their sides; this rubs the needles one by the side of the other, and against the buckram, and the emery gives them a high polish. This process is continued for a day, or for fine goods two days. When it is judged that the polishing is complete, the rolls are untied, and the needles contained in them thrown into a warm lye of water and soap, in which they are washed, to remove the oil and dirt. Being thus washed, they are thrown into a quantity of dry bran, which is put into a kind of churn, and turned round; this takes up all moisture from the needles: they are now picked out of the bran, and any which have been broken at the eyes or points in polishing are laid aside, and the good ones are laid with the points all one way. The points are next finished and rendered perfectly sharp, by grinding them upon a wooden wheel, covered with emery, being held in the same manner as for the first grinding: this finishes the needles, which are wiped with a cloth rather oily, and are then packed up for sale in small blue papers, containing from 25 to 100 needles, according to their sizes; and a great number of these are made up into larger packets, wrapped in several thicknesses of paper, and a covering of bladder, over which is a packing cloth; in which state they are sent to market.

From what we have described our readers will form some idea of the manufacture of needles, and the means by which common needles can be afforded at the low retail price of eight-pence per hundred; and even the best kinds are not more than two shillings per hundred. The view in our plate is not to be considered as a representation of the arrangement of the real manufactory, the different processes being carried on in separate rooms of an extensive building; the grinding and polishing mill being often a large building detached from the other.

Needle (Magnetical), in navigation, a needle touched with a loadstone, and sustained on a pivot or centre: on which playing at liberty, it directs itself to certain points in or under the horizon; whence the magnetical needle is of two kinds, viz. horizontal and inclinatory.

Horizontal needles are those equally balanced on each side the pivot that sustains them: and which, playing horizontally with their two extremes, point out the north and south points of the horizon.

In the construction of the horizontal needle a piece of pure steel is provided, of a length not exceeding six inches, lest its weight impede its volubility, very thin, to take its verticity the better, and not pierced with any holes, or the like, for ornament sake, which prevent the equable diffusion of the magnetic virtue. A perforation is then made in the middle of its length, and a brass cap or head soldered on, whose inner cavity is conical, so as to play freely on a style or pivot headed with a fine steel point. The north point of the needle in our hemisphere is made a little lighter than the southern; the touch always destroying the balance, if well adjusted before, and rendering the north end heavier than the south, and thus occasioning the needle to dip.

The needles that were formerly applied to the compass, on board merchant ships, were formed of two pieces of steel wire, each being bent in the middle, so as to form an obtuse angle, while their ends, being applied together, made an acute one, so that the whole represented the form of a lozenge. Dr. Knight, who has so much improved the compass, found, by repeated experiments, that partly from the foregoing structure, and partly from the unequal hardening of the ends, these needles not only varied from the true direction, but from one another, and from themselves.

Also the needles formerly used on board the men of war, and some of the larger trading ships, were made of one piece of steel, of a spring temper, and broad towards the ends, but tapering towards the middle. Every needle of this form is found to have six poles instead of two, one at each end, two where it becomes tapering, and two at the hole in the middle.

To remedy these errors and inconveniences, the needle which Dr. Knight contrived for his compass is a slender parallelopipedon, being quite straight and square at the ends, and so has only two poles, although the curves are a little confused about the hole in the middle; though it is, upon the whole, the simplest and best.

Mr. Michell suggests, that it would be useful to increase the weight and length of magnetic

needles, which would render them both more accurate and permanent; also to cover them with a coat of linseed oil, or varnish, to preserve them from any rust.

A needle on occasion may be prepared without touching it on a loadstone: for a fine steel sewing needle, gently laid on the water, or delicately suspended in the air, will take the north-and-south direction.—Thus also a needle heated in the fire, and cooled again in the direction of the meridian, or only in an erect position, acquires the same faculty.

Declination or variation of the needle, is the deviation of the horizontal needle from the meridian: or the angle it makes with the meridian, when freely suspended in an horizontal plane.

A needle is always changing the line of its direction, traversing slowly to certain limits towards the east and west sides of the meridian. It was at first thought that the magnetic needle pointed due north; but it was observed by Cabot and Columbus that it had a deviation from the north, though they did not suspect that this deviation had itself a variation, and was continually changing. This change in the variation was first found out, according to Bond, by Mr. John Mair, secondly by Mr. Gunter, and thirdly by Mr. Gellibrand, by comparing together the observations made at different times near the same place by Mr. Burrowes, Mr. Gunter, and himself, and he published a Discourse upon it in 1635. Soon after this, Mr. Bond ventured to deliver the rate at which the variation changes for several years; by which he foretold that at London in 1657 there would be no variation of the compass, and from that time it would gradually increase the other way, or towards the west, making certain revolutions; which happened accordingly: and upon this variation he proposed a method of finding the longitude, which has been farther improved by many others since his time, though with very little success. See VARIATION.

Inclinatory or dipping-NEEDLE, a magnetihorizontally and pointing out north and south cal needle, so hung, as that, instead of playing one end dips or inclines to the horizon, and the other points to a certain degree of elevation above it. Or a dipping-needle may be defined to be a long straight piece of steel, every way poised on its centre, and afterwards touched with a loadstone, but so contrived as not to play on the point of a pin, as does the common horizontal needle, but to swing in a vertical plane about an axis parallel to the horizon; and thus to discover the exact tendency of the power of magnetism. See MAGNETISM.

To find the longitude or latitude by the dipping-needle. If the lines of equal dip below the horizon be drawn on maps or sea-charts from good observations, it will be easy, from the longitude known, to find the latitude, and from the latitude known to find the longitude, either at sea or land. Suppose, for example, you were travelling or sailing along the meridian of London, and found the angle of dip with a needle of one foot to be 75°, the chart will show that this meridian and the line of dip meet in the latitude 53° 11′, which is, therefore, the latitude sought. (See LATITUDE.) Or suppose you were travelling or sailing along the parallel of London, that is, in 51° 32′ north latitude, and you find the angle of dip to be 74°. The parallel and the line of this dip will meet in the map in 1° 46′ of east longitude from London, which is therefore the longitude sought.

Surgeons' NEEDLES are generally made crooked, and their points triangular: however they are of different forms and sizes, and bear different names, according to the purposes they are used for.

The largest needles are used in amputation; the next, needles for wounds; the finest needles for sutures. They have others, very short and flat, for tendons; others, still shorter, and the eye placed in the middle, for tying together of vessels, &c. Needles for couching cataracts are of various kinds; all of which have a small, broad, and sharp point or tongue; and some with a sulcus at the point. Surgeons have sometimes used two needles in this operation; one with a sharp point for perforating the coats of the eye, and another with a more obtuse point for depressing or couching the opaque crystaline lens: but care should be taken in the use of any of these that they be first well polished before they are applied to the eye.

Mr. Warner observes, that the blade of the couching needle should be at least a third part larger than those generally used upon this occasion, as great advantages will be found in the depressing of the cataract by the increased breadth of the blade of that instrument. The handle, also, if made somewhat shorter than usual, will enable the operator to perform with greater steadiness than he can do with a larger-handled instrument.

It is thought by some, that needles of silver pierce more easily in taking up arteries than those made of steel.

NEEDLE-FISH. See SYGNATHUS.

NEEDLES, sharp-pointed rocks north of the Isle of Wight. They are situated at the western extremity of the island, which is an acute point of high land, from which they have been disjoined by the washing of the sea. There were of these lofty white rocks formerly three, but about 14 years ago the tallest of them, called Lot's Wife, which arose 120 feet above low-water mark, and in its shape resembling a needle, being undermined by the constant efforts of the waves, overset, and totally disappeared.

NEE'DLEFUL. *s.* (*needle* and *full.*) As much thread as is generally put at one time in the needle.

NEEDLER. NEE'DLEMAKER. *s.* (from *needle.*) He who makes needles.

NEEDLER. (Benjamin), a nonconformist minister, was born at Lalam, in Middlesex, and educated at St. John's college, Oxford, of which he was chosen fellow. He died in 1682.

Needler (Thomas), an English writer, had a place in the navy-office, and died in 1718, aged 28. His works in verse and prose were printed in 1 vol. 12mo. by Dr. Duncombe, in 1724, and were well received.

NEE'DLEWORK. *s.* (*needle* and *work.*) 1. The business of a sempstress. 2. Embroidery by the needle (*Addison*).

NEE'DLESS. *a.* (from *need.*) 1. Unnecessary; not requisite (*Hooker*). 2. Not wanting: out of use (*Shakspeare*).

NEE'DLESSLY. *ad.* Unnecessarily; without need (*Holder*).

NEE'DLESSNESS. *s.* Unnecessariness (*Locke*).

NEE'DMENT. *s.* (from *need.*) Something necessary (*Spenser*).

NEEDS. *ad.* (neꝺeꞇ, Saxon, unwilling.) Necessarily; by compulsion; indispensably; inevitably (*Davies*).

NEE'DY. *a.* (from *need.*) Poor; necessitous; distressed by poverty (*Spenser*).

NE'ER. (for *never*). (*Hudibras*).

To NEESE. *v. n.* (*nyse*, Danish; *niesen*, Dutch.) To sneeze; to discharge flatulencies by the nose (*Kings*).

NE EXEAT REGNO, in law, is a writ to restrain a person from going out of the kingdom without the king's licence. F. N. B. 85. It may be directed to the sheriff, to make the party find surety that he will not depart the realm, and on refusal to commit him to prison: or it may be directed to the party himself; and if he then goes, he may be fined.

NEEHEEHEOW, one of the Sandwich islands, five leagues W. of Atooi. The E. coast is high, and rises abruptly from the sea; the rest of it consists of low ground, except a round bluff head on the S. E. point. It produces plenty of yams.

NEERWINDEN, a village of Austrian Brabant, a little N. by W. of Landen. Hence the two celebrated battles of Landen are sometimes called by the name of Neerwinden. See Landen.

NEF. *s.* (old French, from *nave.*) The body of a church; the nave (*Addison*).

NEFA'RIOUS. *a.* (*nefarius*, Latin.) Wicked; abominable (*Ayliffe*).

NEFASTI DIES, in Roman antiquity, an appellation given to those days wherein it was not allowed to administer justice or hold courts. They were so called because, *non fari licebat*, the prætor was not allowed to pronounce the three solemn words or formulas of the law, *do, dico, addico*, I give, I appoint, I adjudge. These days were distinguished in the calendar by the letter N. for *nefastus*; or N. P. *Nefastus Primo*, when the day was only *nefastus* in the forenoon, or fore part. The days of a mixed kind were called *intercisi*.

NEGAPATAM, a city of the peninsula of Hindoostan, on the coast of Coromandel. It was first a colony of the Portuguese, but was taken by the Dutch. The latter were dispossessed of it by the English in 1782; but by the peace of 1783 it was agreed to be restored by the Dutch, whenever they should give an equivalent for it. Negapatam is 183 miles S. of Madras. Lon. 79. 56 E. Lat. 10. 46 N.

NEGA'TION. *s.* (*negatio*, Lat. *negacion*, Fr.) 1. Denial: the contrary to *affirmation* (*Rogers*). 2. Description by denial, or exclusion, or exception (*Watts*). 3. Argument drawn from denial (*Heylin*).

NE'GATIVE. *a.* (*negatif*, Fr. *negativus*, Lat.). 1. Denying: contrary to *affirmative*. 2. Implying only the absence of something; not positive; privative (*South*). 3. Having the power to withhold, though not to compel (*King Charles*).

Ne'gative. *s.* 1. A proposition by which something is denied (*Tillotson*). 2. A particle of denial: as, *not* (*Cleveland*).

Negative sign. The use of the negative sign in algebra is attended with several consequences that at first sight are admitted with difficulty, and has sometimes given occasion to notions that seem to have no real foundation. This sign implies, that the real value of the quantity represented by the letter to which it is prefixed is to be subtracted; and it serves, with the positive sign, to keep in view what elements or parts enter into the composition of quantities, and in what manner, whether as increments or decrements (that is, whether by addition or subtraction); which is of the greatest use in this art.

In consequence of this, it serves to express a quantity of an opposite quality to the positive, as a line in a contrary position; a motion with an opposite direction; or a centrifugal force in opposition to gravity; and thus often saves the trouble of distinguishing, and demonstrating separately the various cases of proportions, and preserves their analogy in view. But as the proportions of lines depend on their magnitude only, without regard to their position, and motions and forces are said to be equal or unequal, in any given ratio, without regard to their directions; and, in general, the proportion of quantity relates to their magnitude only, without determining whether they are to be considered as increments or decrements; so there is no ground to imagine any other proportion of $-b$ and $+a$ (or of -1 and 1) than that of the real magnitudes of the quantities represented by b and a, whether these quantities are, in any particular case, to be added or subtracted. It is the same thing to subtract a decrement, as to add an equal increment, or to subtract $-b$ from $a-b$, as to add $+b$ to it: and because multiplying a quantity by a negative number implies only a repeated subtraction of it, the multiplying $-b$ by n, is subtracting $-b$ as often as there are units in n; and is therefore equivalent to adding $+b$ so many times, or the same as adding $+nb$. But if we infer from this, that 1 is to $-n$ as $-b$ to nb, according to the rule, that unit is to one of the factors as the other factor is to the product, there is no ground to imagine that there is any mystery in this or any other meaning, than that the real magnitudes represented by 1, n, b, and nb are proportional. For that rule relates only to the magnitude of the factors

and product, without determining whether any factor, or the product, is to be added or subtracted. But this likewise must be determined in algebraic computations; and this is the proper use of the rules concerning the signs, without which the operation could not proceed. Because a quantity to be subtracted is never produced in composition by any repeated addition of a positive, or repeated subtraction of a negative, a negative square number is never produced by composition from the root. Hence $\sqrt{-1}$, or the square root of a negative, implies an imaginary quantity; and, in resolution, is a mark or character of the impossible cases of a problem, unless it is compensated by another imaginary symbol or supposition, when the whole expression may have a real signification. Thus $1 + \sqrt{-1}$, and $1 - \sqrt{-1}$ taken separately, are imaginary, but their sum is 2; as the conditions that separately would render the solution of a problem impossible, in some cases destroy each others effect when conjoined. In the pursuit of general conclusions, and of simple forms representing them, expressions of this kind must sometimes arise where the imaginary symbol is compensated in a manner that is not always so obvious.

By proper substitutions, however, the expression may be transformed into another, wherein each particular term may have a real signification as well as the whole expression. The theorems that are sometimes briefly discovered by the use of this symbol may be demonstrated without it by the inverse operation, or some other way; and though such symbols are of some use in the computations by the method of fluxions, its evidence cannot be said to depend upon arts of this kind. See Maclaurin's Fluxions, book ii. chap. 1; Ludlam's Algebra, *passim*; Baron Maseres on the Negative Sign, and Carnot's Geometrie de Position.

NEGATIVE ELECTRICITY. See ELECTRICITY.

NE'GATIVELY. *ad.* (from *negative.*) 1. With denial; in the form of denial; not affirmatively (*Boyle*). 2. In form of speech implying the absence of something (*Hooker*).

NEGINOTH. This term is read before some of the Psalms, as Psalm lxvii. It signifies stringed-instruments of music, to be played on by the fingers, or women-musicians; and the titles of those psalms where this word is found may be thus translated, A psalm of David to the master of music, who presides over the stringed-instruments.

To NEGLE'CT. *v. a.* (*neglectus*, Latin.) 1. To omit by carelessness (*Milton*). 2. To treat with scornful heedlessness (*Milt.*). 3. To postpone (*Shakspeare*).

NEGLE'CT. *s.* (*neglectus*, Latin.) 1. Instance of inattention. 2. Careless treatment (*Shakspeare*). 3. Negligence; frequency of neglect (*Denham*). 4. State of being unregarded (*Prior*).

NEGLE'CTER. *s.* (from *neglect.*) One who neglects.

NEGLE'CTFUL. *a.* (*neglect* and *full.*) 1. Heedless; careless; inattentive (*Arbuth.*). 2. Treating with indifference (*Locke*).

NEGLE'CTFULLY. *ad.* With heedless inattention: not used.

NEGLE'CTION. *s.* (from *neglect.*) The state of being negligent (*Shakspeare*).

NEGLE'CTIVE. *a.* (from *neglect.*) Inattentive to; regardless of (*King Charles*).

NE'GLIGENCE. *s.* (*negligence*, French). 1. Habit of omitting by heedlessness, or of acting carelessly. 2. Instance of neglect (*Shaks.*).

NE'GLIGENT. *a.* (*negligent*, French.) 1. Careless; heedless; habitually inattentive (*Chronicles*). 2. Careless of any particular (*Baruch*). 3. Scornfully regardless (*Swift*).

NE'GLIGENTLY. *ad.* 1. Carelessly; heedlessly; without exactness (*Bacon*). 2. With scornful inattention.

To NEGO'TIATE. *v. n.* (*negocier*, Fr.) To have intercourse of business; to traffic; to treat (*Bacon*).

NEGOTIA'TION. *s.* (*negotiation*, Fr.) Treaty of business (*Howel*).

NEGOTIA'TOR. *s.* (*negotiateur*, French.) One employed to treat with others (*Swift*).

NEGRIL POINT, the most westerly promontory of the island of Jamaica.

NEGRO, *Homo pelli nigra*, a name given to a variety of the human species who are entirely black, and are found in the torrid zone, especially in that part of Africa which lies within the tropics. In the complexion of negroes we meet with many various shades: but they likewise differ far from other men in all the features of their face. Round cheeks, high cheek-bones, a forehead somewhat elevated, a short, broad, flat nose, thick lips, small ears, ugliness and irregularity of shape, characterise their external appearance. See HOMO.

NEGRO (Cape), a promontory of Africa on the W. coast of Angola, being the most southerly country to which the Europeans usually resort to purchase slaves. Lon. 10. 40 E. Lat. 15. 54 N.

NEGRO'S-ISLAND, one of the Philippine islands, between Panay and Zebu.

NEGROLAND, or NIGRITIA, a country of Africa, through which the river Niger is supposed to run. It has the great desert of Zahara on the N. and stretches far to the S., but the inland parts are very little known. The Europeans have many settlements on the coast, where they barter European goods for slaves, gold dust, and elephants teeth.

NEGROPONT, an island of Turkey in Europe, the largest in the Archipelago. It was anciently called Eubœa, and is near the N. coast of Livadia, separated from it by the strait of Negropont, over which is a bridge. It is 90 miles in length, and 25 in breadth, though in some places much narrower. It abounds in corn, wine, and fruits.

NEGROPONT, a strong city, capital of an island of the same name, and a Greek archbishop's see. It has a good harbour, which is commonly the station of the Turkish ships. The walls of the city, in which the Turks and Jews reside, are two miles and a half in cir-

cumference; but the suburbs, where the Christians live, are much larger. It was taken in 1469 from the Venetians, who attempted to retake it in 1688, without effect. It is seated on a strait of the same name, 30 miles N.E. of Athens, and 260 S.W. of Constantinople. Lon. 24. 8 E. Lat. 38. 30 N.

NEHAVEND, a town of Persia, in Irac-Agemi, famous for a battle fought near it, between the califf Omar and Yex Degerd, king of Persia, in 638, when the latter lost his life and kingdom. It is 200 miles N.W. of Ispahan. Lon. 48. 10 E. Lat. 34. 20 N.

NEHEMIAH, or NEEMIAS, son of Hachaliah, was born at Babylon during the captivity, (Neh. i. 1, 2, &c.) He was, according to some, of the race of the priests, but, according to others, of the tribe of Judah and the royal family. Those who maintain the first opinion support it by a passage in Ezra, (x. 10.) where he is called a priest; but those who believe that he was of the race of the kings of Judah, say, 1st, That Nehemiah having governed the republic of the Jews for a considerable time, there is great probability he was of that tribe of which the kings always were. 2dly, Nehemiah mentions his brethren Hanani and some other Jews, who, coming to Babylon during the captivity, acquainted him with the sad condition of their country. 3dly, The office of cup-bearer to the king of Persia, to which Nehemiah was promoted, is a farther proof that he was of an illustrious family. 4thly, He excuses himself from entering into the inner part of the temple, probably because he was only a laic, (Neh. vi. 11.) "Should such a man as I flee? And who is there that, being as I am, would go into the temple to save his life?" The scripture (Ezra ii. 62. Nehem. vii. 95.) calls him תרשתא, *tirshatha*, that is to say, cup-bearer; for he had this employment at the court of Artaxerxes Longimanus.

The book which in the English bible, as also in the Hebrew, has the name of Nehemiah, in the Latin bible is called the book of Esdras; and it must be confessed, that though this author speaks in the first person, and though at first reading one would think that he had writ it day by day as the transactions occurred, yet there are some things in this book which could not have been written by Nehemiah himself; for example, memorials are quoted wherein were registered the names of the priests in the time of Jonathan the son of Eliashib, and even to the times of the high-priest Jaddus, who met Alexander the Great. These therefore must have been added afterwards.

It may well be questioned whether this Nehemiah be the same that is mentioned in Ezra, (ii. 2. and Neh. vii. 7.) as one that returned from the Babylonish captivity under Zerubbabel; since from the first year of Cyrus to the twentieth of Artaxerxes Longimanus, there are no less than ninety-two years intervening; so that Nehemiah must at this time have been a very old man, upon the lowest computation an hundred, consequently utterly incapable of being the king's cup-bearer, of taking a journey from Shushan to Jerusalem, and of behaving there with all the courage and activity that is recorded of him. Upon this presumption, therefore, we may conclude that this was a different person, though of the same name, and that Tirshatha (the other name by which he is called, Ezra ii. 63. and Neh. vii. 65.) denotes the title of his office, and both in the Persian and Chaldean tongues was the general name given to the king's deputies and governors.

NEHOW, one of the Sandwich islands, discovered by captain Cook in his last voyage to the Pacific Ocean: they are eleven in number, and are situated from N. lat. 18° 44′ to 22° 15′, and from W. lon. 154° 56′ to 160° 24′. They are not very particularly described in any account that has hitherto appeared.

NEIDENBURG, a town of Prussia, with a castle on a mountain, 75 miles E. of Culm. Lon. 20. 20 E. Lat. 53. 22 S.

NEIF. *s.* (*nefi*, Islandic; *neaf*, Scottish.) Fist. It is also written *neaf* (*Shakspeare*).

To NEIGH. *v. n.* (hnæᵹan, Saxon.) To utter the voice of a horse (*Smith*).

NEIGH. *s.* The voice of a horse (*Shaks.*).

NEI'GHBOUR. *s.* (neahᵹebur, Saxon.) 1. One who lives near to another (*Clarendon*). 2. One who lives in familiarity with another; a word of civility (*Shakspeare*). 3. Any thing next or near (*Shakspeare*). 4. Intimate; confidant (*Shakspeare*). 5. (In divinity.) One partaking of the same nature, and therefore entitled to good offices.

To NEI'GHBOUR. *v. a.* (from the noun.) 1. To adjoin to; to confine on (*Shakspeare*). 2. To acquaint with; to make near to (*Shakspeare*).

NEI'GHBOURHOOD. *s.* (from *neighbour.*) 1. Place adjoining (*Addison*). 2. State of being near each other (*Swift*). 3. Those that live within reach of communication (*Harte*).

NEI'GHBOURLY. *a.* (from *neighbour.*) Becoming a neighbour; kind; civil (*Arbuth*).

NEI'GHBOURLY. *ad.* With social civility.

NEIRA, one of the Banda islands, and the seat of their government. It has a spacious harbour, but difficult to be entered; and ships anchor under the cannon of two forts. Lon. 129. 30 E. Lat 4. 50 S.

NEISSE, a city of Silesia, capital of a principality of the same name. It is a place of great strength, and one of the finest towns in Silesia. Here is a magnificent palace, with several offices for the principality; but the seat of government is the castle of the adjacent small town of Ottmachau. The inhabitants carry on a considerable trade in linens and wine. This place was taken by the Prussians in 1741, who, after the peace in 1742, built a citadel, to which they gave the name of Prussia. In 1758 it was besieged by the Austrians, but ineffectually. In 1807 it surrendered to the French. It is seated on a river of the same name, 48 miles S. by E. of Breslau. Lon. 17. 20 E. Lat. 50. 24 N.

NEITHER. *conjunct.* (napðeꞃ, Saxon.) 1. Not either. A particle used in the first branch of a negative sentence, and answered by *nor:* as, fight *neither* with small *nor* great. 2. It is sometimes the second branch of a negative or prohibition to any sentence; as, ye shall *not* eat of it, *neither* shall ye touch it.

NEI'THER. *pronoun.* Not either; nor one nor other (*Dryden*).

NELEUS, a son of Neptune and Tyro, was brother to Pelias, with whom he was exposed by his mother. They were, however, preserved, and brought to Tyro, who had then married Cretheus, king of Iolchos. After the death of Cretheus, Pelias and Neleus seized the kingdom of Iolchos, which belonged to Æson, the lawful son of Tyro, by the deceased monarch. After they had reigned for some time conjointly, Pelias expelled Neleus from Iolchos. Neleus came to Aphareus, king of Messenia, who treated him with kindness, and permitted him to build a city, which he called Pylos. Neleus married Chloris, the daughter of Amphion, by whom he had a daughter and twelve sons, who were all, except Nestor, killed by Hercules, together with their father. Neleus promised his daughter in marriage only to him who brought him the bulls of Iphiclus. Bias was the successful lover.

NELLENBURG, a town of Suabia, capital of a landgravate of the same name, with a citadel on a mountain, 22 miles N. of Constance. Lon. 9. 5 E. Lat. 47. 57 N.

NELLORE, a town and fortress of Hindoostan, in the Carnatic, near the Pennar, 85. miles N. by W. of Madras. Lon. 79. 57 E. Lat. 14. 26 N.

NELSON (Robert), generally called the pious Nelson, was born in London, 1656. He was educated at St. Paul's school, and afterwards at Saddington, Gloucestershire, and then sent to Trinity college, Cambridge. In 1680 he was admitted fellow of the Royal Society, and began his travels with his friend Dr. Halley. He visited Paris, and proceeding to Rome, he became acquainted with lady Theophila Lucy, widow of sir Kingsmill Lucy, bart. whom he married on his return to England. This lady declared herself of the catholic persuasion; but hough she wrote in favour of her principles, against what her husband published, their mutual affection was never embittered by religious disagreements. Nelson remained attached to his creed, and to his sovereign, and refused to transfer his allegiance to William. He was still regarded by Tillotson, though they disagreed in political opinions; and such was their attachment, that the prelate was attended in his last illness by his friend, and died in his arms. In 1709 he returned to the communion of the church of England. He was attacked by an asthma and dropsy in the breast, of which he died at Kensington, 1715. This great, learned, and amiable man wrote various works, the best known of which are his Companion for the Festivals and Fasts of the Church of England, 8vo. a useful work, often reprinted. He wrote besides, the Practice of True Devotion, 12mo.—Transubstantiation contrary to Scripture, 4to.—The great Duty of frequenting the Christian Sacrifice, 8vo.—The Life of Bishop Bull, 8vo. A Letter to Clarke on his Doctrine of the Trinity—Address to Persons of Quality, &c.—The whole Duty of a Christian, in question and answer, &c.

NELSON (Horatio Viscount), an illustrious English seaman, fourth son of the rev. Edw. Nelson, born 1758 at Burnham Thorpe, Norfolk. At the age of 12, when the nation was threatened with war, about the Falkland islands, he entered on board the Raisonable of 64 guns, under his maternal uncle captain Suckling. In 1773 he accompanied the expedition sent under the command of captains Phipps and Lutwidge on a voyage of discovery to the North pole, and on his return he went to the West Indies on board the Sea-horse under captain Farmer. In 1777 he was employed as second of the Lowestoffe, of 32 guns, on the Jamaica station, from which he was removed to the command of a schooner, and thus was enabled to acquire a perfect knowledge of the intricate navigation of the seas near Hispaniola. In June 1779 he was made post captain, and when an attack was expected in Jamaica from D'Estaing, the youthful hero was entrusted with the care of the batteries of Port Royal, and the defence of Kingston and Spanish Town. In the attack upon Fort Juan, in the gulf of Mexico, his perseverance was of infinite benefit to the public service, and he continued on the American station till the peace. In 1783 he visited France, and the next year he was appointed to the Boreas of 28 guns, at the Leeward islands, and there married, 1787, Frances Herbert Nesbit, widow of Dr. Nesbit, of Nevis, and daughter of W. Herbert, Esq. senior judge of that island. He returned to England 1787, and retired to Burnham Thorpe till 1793, when the war with France called upon him for the exertion of his great talents. He obtained the Agamemnon, of 64 guns, and joined lord Hood in the Mediterranean, where he assisted at the taking of Toulon, and at the siege of Bastia, in which he superintended the disembarkation of the troops. He afterwards encountered five French ships of war, and then supported the siege of Calvi, where he lost the sight of his right eye. He continued to distinguish himself, particularly in the engagements with the French fleet, March and July, 1795, and in the blockade of Genoa. He next removed from the Agamemnon to the Captain, and soon after obtained a commodore's pendant, and was employed in the blockade of Leghorn, and the taking of Porto Ferrajo. On his passage to Gibraltar, in the Minerva frigate, he fell in with two Spanish frigates, one of which, of 40 guns, he took, and sailing to join admiral Jervis, he was pursued by two ships of the Spanish fleet, a circumstance quickly communicated to the commander in chief, and in a few hours productive of a general action. In

this memorable fight, in which 15 English ships defeated a Spanish fleet of 27 ships, and took four three-deckers, he behaved with his usual gallantry. In the Captain, to which he had shifted his flag, he attacked the Santissima Trinidada, of 136 guns, and passing to the St. Nicholas, of 80 guns, and then to the San Joseph, of 112 guns, he saw both these ships strike to his superior valor. For this gallant conduct he was created knight of the Bath, and made rear admiral of the blue, and appointed to the command of the inner squadron in the blockade of Cadiz. He was next sent to take the town of Santa Cruz, in the island of Teneriffe; but though he obtained possession of the place for seven hours, he was unable to reduce the citadel. During this desperate attack he lost his right hand, which was shattered by a shot, but his life was preserved by his son-in-law, captain Nesbit, who, during the darkness of the night, missed him from his side, and returning found him exhausted on the ground, and carried him on his back to the shore, where a boat conveyed him to his ship. In consequence of his wound he received a pension of 1000l.; and in the memorial which he presented to his majesty on the occasion, he declared with truth, that in the services in which he had been employed he had been engaged with the enemy upwards of 100 times. He also received the freedom of the city of London in a gold box. He was next sent up the Mediterranean to watch the motions of the French ships, which were to convey Bonaparte to the invasion of Egypt. Notwithstanding his vigilance, the fleet escaped, but he pursued it, and after returning from the Egyptian shores to Sicily, almost in despair, he again hastened to the mouth of the Nile; and to the general joy of his fleet perceived the enemy moored in an advantageous situation in the bay of Aboukir. The attack immediately began, and by a bold manœuvre part of his ships sailed between the enemy and the land, exposed to a double fire. The action continued during the night, and the sudden explosion of the French admiral's ship, the Orient, of 120 guns, added to the terrors of the scene. The rising day exhibited to the British seamen the pleasing sight of dismasted and submissive ships; and of the whole fleet only two men of war and two frigates escaped. The fame of this glorious victory, which thus captured or destroyed eleven sail of the line, was received with general exultation. Europe re-echoed the praises of the British hero, and the emperor of Germany was, in consequence, prevailed upon to renew the war, by breaking off the insidious conferences of Radstadt, and the Porte declared itself an open enemy against the unprincipled invaders of Egypt. The brave admiral was created a baron, by the title of Nelson of the Nile, with the grant of a pension of 2000l. more; the sultan honoured him with an aigrette, and pelisse, and the king of Naples conferred on him an estate in Sicily, with the title of duke of Bronte. His next expedition was to break that confederacy which the capricious politics of the emperor of Russia had formed with Denmark and Sweden against this country. He embarked as second in command, under sir Hyde Parker, and after passing through the Sound, in defiance of the batteries, he volunteered to make an attack on Copenhagen, 2d April, 1801. After a most vigorous defence, the Danes saw their strong batteries silenced, and 17 of their men of war either sunk, burnt, or taken. A conference with the crown prince succeeded this glorious victory, and after peace was restored by the heroic admiral, between the two countries, the fleet sailed to attack the squadrons of Sweden and Russia; but the sudden death of the emperor Paul rendered further exertions unnecessary. For these services lord Nelson was created a viscount, and his honours made hereditary in his family, even in the female line. In Aug. 1801, he made an unsuccessful attack on Boulogne. After the peace of Amiens, he was, in 1803, summoned from his beloved retreat at Merton, to take the command of the fleet in the Mediterranean. Notwithstanding his vigilance, the French escaped from Toulon, and from the Mediterranean, and after being joined by the Cadiz squadron, they sailed to the West Indies, but he pursued them with rapidity. Such, however, was the terror of his name, that they returned in consternation back to Europe. Thus baffled in his attempts to overtake the enemy, he returned to England for the re-establishment of his health, but in a few weeks he again took the command of the fleet with very unlimited powers. On the 19th of October, 1805, Villeneuve, with the French fleet, and Gravina with the Spanish, sailed from Cadiz, and on the 21st, about noon, the English squadron closed with them off cape Trafalgar. The most precise orders had been previously given by the enlightened commander, so that the fleet was not distracted by signals; and shewing the first example of heroism, the admiral ordered his ship, the Victory, to be carried along side of his old friend the Santissima Trinidada. The carnage on both sides was dreadful, and the heroic chief, unfortunately not covering the insignia, which he wore on his person, became a marked object to the musketeers in the tops of the enemy's ships. A musket ball, from a rifleman of the Bucentaur, struck him in the left breast, and in about two hours after he expired in the arms of victory, rejoicing in the glorious triumphs which his death ensured to his country. On his fall the chief command devolved on admiral Collingwood, who improved the advantages already obtained, and paid an honourable tribute to the many services of the departed hero. Of the 33 ships of the combined fleet, sixteen were destroyed, four were carried to Gibraltar, six escaped into Cadiz, mere wrecks, and four which retired from the action, were 13 days after captured by sir R. Strachan's squadron. The remains of the hero of Trafalgar were brought in his own ship to the mouth of the Thames, and conveyed to Greenwich,

and on the ninth of the following January they were deposited in St. Paul's cathedral, with all the pomp and solemnity which a grateful nation could pay to a departed conqueror. His brother, the heir of his honours, was raised to an earldom, and a sum of money was voted by parliament, for the purchase of an estate to perpetuate the memory of the conqueror. As a professional character, lord Nelson possessed a mighty genius, an ardent spirit, and a resolute mind; cool, prompt, and discerning in the midst of dangers, he roused all his powerful energies into action, and the strong faculties of his soul were vigilantly exerted in the midst of the fury of battle, to make every accident contribute to the triumph of his crew, and to the glory of his country. His presence was a talisman to the courage of his sailors, who fought under him as sure of victory, and regarded his approbation as the best solace for their fatigues and their sufferings. In his manners he was polished and gentle; he was no stranger to the mild charities of human nature, and in his heart he felt all the emotions of a devout and pious christian. His dispatches from Aboukir, in which he attributed his success to Providence, excited sentiments of respect through the nation, and it was on that memorable occasion that his father exclaimed, "Oh, my great and good son!" (*Lempriere*).

NELUMBIUM, in botany, a genus of the class polyandria, order polygynia. Calyx four or five-leaved; petals numerous; nuts one-seeded, crowned with the permanent style, immersed in a truncate receptacle. Four species; three common to North America, and one, N. speciosum, indigenous to India. This last species has been usually, though erroneously, regarded as a water-lily, and described under the specific name of nymphæa nelumbo. Its leaves are peltate, orbicular, very entire; peduncles and petioles muricate; petals numerous; calyx often four-cleft: flowers as large as, or larger than the palm of the hand, of a purple hue. The root is horizontal, long, creeping, consisting of joints linked together, ovate-oblong, white, fleshy, esculent, tubular within. The Chinese have them not only served up in summer, with ice, but laid up in salt and vinegar for winter. The seeds are somewhat of the size and form of an acorn, and of a taste more delicate than that of almonds. The ponds in China are generally covered with this plant, and exhibit a very beautiful appearance when it is in flower; nor are the flowers less fragrant than handsome. In our own country it is best cultivated in troughs or cisterns that have earth at their bottoms, in which situation it produces excellent flowers. In its native soil this plant is propagated either by roots or seeds, as the common water-lily among ourselves.

NEMÆA, a town of Argolis, between Cleonæ and Philus, with a wood, where Hercules, in the 16th year of his age, killed the celebrated Nemæan lion, which was born of the hundred-headed Typhon, and infested the neighbourhood of Nemæa, and kept the inhabitants under continual alarms. It was the first labour of Hercules to destroy it. The conqueror clothed himself in the skin, and the Nemæan games were instituted to commemorate so great an event, though some say that they were instituted by the Argive in honour of Archemorus. (*Vide* ARCHEMORUS.)

NEMESIANUS (Aurelius Olympius), a Latin poet, who was born at Carthage, and flourished about the year 281, under the emperor Carus, and his sons Carinus and Numerian: the last of which emperors was so fond of poetry that he contested the glory with Nemesianus, who had written a poem upon fishing and maritime affairs. We have still remaining a poem of our author called Cynegeticon, and four eclogues: they were published by Paulus Manutius in 1538; by Barthelet in 1613; at Leyden in 1653, with the notes of Janus Vlitias. Giraldi has preserved a fragment of Nemesianus, which was communicated to him by Sannazarius, to whom we are obliged for our poet's works: for having found them written in Gothic characters, he procured them to be put into the Roman, and then sent them to Paulus Manutius. Although this poem hath acquired some reputation, it is greatly inferior to those of Oppian and Gratian upon the same subject; yet Nemesianus's style is natural enough, and has some degree of elegance. The world was so much possessed with an opinion of his poem in the eighth century, that it was read among the classics in the public schools, particularly in the time of Charlemagne, as appears from a letter of the celebrated Hincmar bishop of Rheims to his nephew Hincmar of Laon.

NEMESIS, in Pagan worship, the daughter of Jupiter and Necessity, or, according to others, of Oceanus and Nox, had the care of revenging the crimes which human justice left unpunished. She was also called Adrastæa, because Adrastus king of Argos first raised an altar to her; and Rhamnusia, from her having a magnificent temple at Rhamnus in Attica. She had likewise a temple at Rome in the Capitol. She is represented with a stern countenance, holding a whip in one hand and a pair of scales in the other.

NEMESIUS, a Greek philosopher, who embraced Christianity, and was made bishop of Emesa in Phœnicia, where he had his birth: he flourished in the beginning of the fifth century. We have a piece by him, intitled *De natura hominis,* in which he refutes the fatality of the Stoics and the errors of the Manichees, the Apollinarists, and the Eunomians; but he espouses the opinion of Origen concerning the pre-existence of souls. This treatise was translated by Valla, and printed in 1535. Another version was afterwards made of it by Ellebodius, and printed in 1665; it is also inserted in the Bibliotheca patrum, in Greek and Latin. Lastly, another edition was published at Oxford in 1671, folio, with a learned preface, wherein the editor endeavours to prove,

from a passage in this book, that the circulation of the blood was known to Nemesius; which, however, was since shown to be a mistake by Dr. Friend, in his History of Physic.

NEMINE CONTRADICENTE, "none contradicting it;" a term chiefly used in parliament when any thing is carried without opposition.

NEMOTELUS, in entomology, a tribe in the arrangement of Fabricius belonging to the genus MUSCA, which see.

NEMOURS, a town of France, in the department of Seine and Marne, with an old castle. It is seated on the Loing, between two hills, on the spot where stood the town of Grex, in the time of Cæsar, 10 miles S. of Fontainbleau, and 15 S.E. of Paris. Lon. 2. 37 E. Lat. 48. 16 N.

NEN, the principal river of Northamptonshire, which rises in the W. part of the county, and is made navigable at Northampton. It leaves the county at Peterborough, and crossing the isle of Ely, forms part of the W. boundary of Norfolk, and falls into the Lincolnshire Wash. It likewise communicates, by several channels, with the Great Ouse.

NENAGH, a town of Ireland, in the county of Tipperary, with an ancient and strong castle. It is seated on a branch of the Shannon, 19 miles NE. of Limerick, and 23 N of Cashel.

NENIA, or NAENIA, in the ancient poetry, a kind of funeral song sung to the music of flutes at the obsequies of the dead. Authors represent them as sorry compositions, sung by hired women-mourners called Præficæ. The first rise of these Nenia is ascribed to the physicians. In the heathen antiquity, the goddess of tears and funerals was called Nenia; whom some suppose to have given that name to the funeral song, and others to have taken her name from it.

NEOCASTRO, a fort of Turkey in Europe, in Romania, where the Turks always keep a good garrison. It is seated in the middle of the strait of Constantinople, 12 miles from Constantinople. Lon. 29. 4 E. Lat. 41. 10 N.

NEOMENIA, or NOUMENIA, a festival of the ancient Greeks, at the beginning of every lunar month, which, as the name imports, was observed upon the day of the new moon, in honour of all the gods, but especially Apollo, who was called Neomenios, because the sun is the fountain of light; and whatever distinction of times and seasons may be taken from other planets, yet they are all owing to him as the original of those borrowed rays by which they shine.

The games and public entertainments at these festivals were made by the rich, to whose tables the poor flocked in great numbers. The Athenians at these times offered solemn prayers and sacrifices for the prosperity of their country during the ensuing month. See GAMES.

NEOPHYTES, Νεοφυτοι, in the primitive church, were new Christians; or the heathens newly converted to the faith.

The word signifies a new plant; being formed of the Greek νεος, new; and φυω, I produce; q. d. newly-born; baptism, whereby they commenced Neophytes, being emblematical of new birth.

The fathers never discovered the mysteries of their religion to the Neophytes.

The term Neophyte is still applied to the converts which the missionaries frequently make among the infidels. The Japonese Neophytes, in the latter end of the sixteenth and beginning of the seventeenth century, are said to have shewn prodigies of courage and faith, equal to any known in the primitive church. See CATECHUMEN.

NEOPTOLEMUS, a king of Epirus, son of Achilles and Deidamia, called Pyrrhus from the yellow colour of his hair. He gave early proofs of his valour. After the death of Achilles, Calchas declared in the assembly of the Greeks, that Troy could not be taken without the assistance of his son. Ulysses and Phœnix were then commissioned to bring Pyrrhus to the war, who returned with them with pleasure, and received the name of Neoptolemus, (new soldier.) He greatly signalized himself during the remaining time of the siege, and was the first who entered the wooden horse. He was inferior to none of the Grecian warriors in valour, and Ulysses and Nestor alone could claim a superiority over him in eloquence, wisdom, and address. His cruelty, however, was as great as that of his father. Without any regard to the sanctity of the place where Priam had taken refuge, he slaughtered him without mercy. He also sacrificed Astyanax to his fury, and immolated Polyxena on the tomb of Achilles. When Troy was taken, Pyrrhus had for his share of the captives Andromache, the widow of Hector, and Helenus, the son of Priam. With these he departed for Greece, and took a different course from the rest of the Greeks, as he travelled over the greatest part of Thrace, where he had a severe encounter with queen Harpalyce. (Vide HARPALYCE.) The place of his retirement after the Trojan war is not known: he, however, lived with Andromache after his arrival in Greece. He had a son by this unfortunate princess called Molossus, and two others, if we rely on the authority of Pausanias. Besides Andromache he married Hermione, the daughter of Menelaus, as also Lanassa, the daughter of Cleodæus, one of the descendants of Hercules. The cause of his death is variously related. According to Virgil, Paterculus, and Hyginus, he was murdered by Orestes in the temple at Delphi, because Hermione, who had been betrothed to him, was given to Neoptolemus. The plunder of the rich temple of Delphi was, it is said, the object of the journey of Neoptolemus thither; and it cannot but be observed, that he suffered the same barbarities which he had inflicted in the temple of Minerva upon the aged Priam and his wretched family. From this circumstance arose the

All nations had also a Neptune of their own, and all these Neptunes had, in like manner, something that was very manifestly like and unlike to one another: Diodorus Siculus speaks of an altar in Arabia dedicated to Neptune, standing upon the sea-side. Sanchuniathon says, that Usoüs was the first who hollowed the body of a tree, and in Phœnicia durst adventure to trust himself with the waves of the sea. The Neptune of the Phœnicians is ancienter than him of the Greeks and Latins, as they were navigators before the others; and him they made to be the son of Pontus: the Egyptians had also their Neptune.

NEPTUNEANS, those geologists who adopt the opinion that the present appearances, stratafication, of the terrestrial surface have been occasioned by the operation of water.

NERAC, a town of France, in the department of Lot and Garonne, divided by the river Baise into great and little Nerac. In the feudal times this was the residence and capital of the lords of Albret. Their stupendous castle is now in ruins; but, before the abolition of royalty, no true Frenchman could visit it without sentiments of veneration; for here their once favourite Henry IV. spent part of his youth. Nerac is 20 miles S.W. of Agen, and 380 S. by W. of Paris. Lon. 0. 13 E. Lat. 44. 2 N.

NERBUDDA, a river of India, which issues from a lake on the southern confines of the province of Allahabad, forms the boundary between Hindustan Proper and the Deccan, and falls into the gulf of Cambay, below Baroach.

NEREIDS, nymphs of the sea, daughters of Nereus and Doris. They were fifty, according to the greater number of the mythologists, and were implored as the rest of the deities. They had altars chiefly on the coast of the sea, where milk, oil, honey, and often flesh of goats, were offered up. Their duty was to attend upon the more powerful deities of the sea, and to be subservient to the will of Neptune. They are represented as young and handsome virgins, sitting on dolphins, and holding Neptune's trident in their hand, or sometimes garlands of flowers. (*Ovid. Hesiod. Homer.* &c.)

NEREIUS, a name given to Achilles, as son of Thetis, who was one of the Nereids.

NEREIS. In zoology, a genus of the class vermes, order mollusca. Body oblong, creeping with numerous lateral peduncles or feet on each side; feelers simple, rarely feelerless; eyes two, or four; rarely eyeless. Twenty-nine species, thus subdivided:

A. Mouth furnished with a claw or forceps.

B. Mouth furnished with a proboscis.

C. Mouth furnished with a tube.

Excepting four or five, these all inhabit the North Seas; three or four are found on our own coasts. We shall select an example or two.

1. N. noctiluca. Body blue-green, with [illegible] six segments; hardly visible to the the huge. These are found in the British and in most other seas, and are the animals which frequently illuminate the water, making it appear as if on fire: they are extremely minute, pellucid and highly phosphoreous, giving an uncommonly lucid splendour to the waves in an evening; by their great numbers and minuteness they easily elude observation, but may be detected by passing a small quantity of the water through blotting-paper.

2. N. pelagica. Body above convex, peduncles cirrate and warty: back with a scarlet line down the middle. Inhabits the British and other European seas, among the roots of ulvæ, under stones, and in empty shells; about seven inches long, and has a flexuous kind of motion.

3. N. lamelligera. Body flattish, and tapering both ways; proboscis stellate with four flesh colour spines; peduncles compressed, and furnished with a semilunar scale above, and a large semi-cordate one beneath; eyes two, black; dark line down the belly; tail bifid. Inhabits the Indian, Mediterranean, and Northern seas, among aquatic plants, and is nearly two feet long. See Nat. Hist. Pl. CXLI.

NEREUS, a heathen deity of the sea, son of Oceanus and Terra. He married Doris, by whom he had fifty daughters called the Nereids. (See Nereids.) Nereus was generally represented as an old man with a long flowing beard, and hair of an azure colour. The chief place of his residence was in the Ægean sea, where he was surrounded by his daughters, who often danced in chorussus round him. He had the gift of prophecy, and informed those that consulted him of the different fates that attended them. The word Nereus is often taken for the sea itself. Nereus is sometimes called the most ancient of all the gods.

NERI (Philip de), an historian, born at Florence, 1485. He was one of the 48 magistrates called senators, and after a life devoted to public services, he died at Florence, 1556. His history of Florentine affairs from 1214 to 1537 appeared 1728 in folio.

Neri (St. Philip de), of Florence, founded the congregation of the oratory in Italy, whose duties were to administer to the wants of the poor, to attend the sick, and to relieve strangers and distressed pilgrims. He died 1595, aged 80.

Neri (Pompeio), a Florentine, law professor at Pisa, distinguished in the affairs of Maria Theresa, and of the duke of Lorraine. He founded the botanical academy of Florence, and died there, 1776, aged 69. He was author of Observations on the Tuscan Nobility, on the Imports of Milan, on the Legal Value of Coin, &c.

NERICIA, a province of Sweden Proper; bounded on the N. by Westmania, on the E. by Sudermania, on the S. by E. Gothland, and on the W. by W. Gothland. Orebo is the capital, and the only considerable place in it.

NERITA, Nerite. In zoology, a genus of the class vermes, order testacea. Animal a

limax: shell univalve, spiral, gibbous, flattish at bottom; aperture semi-orbicular, or semilunar; pillar-lip transversely truncate, flattish. Seventy-six species, scattered through the waters of the globe; seven, but of no note, common to the coasts of our own country. They may be thus subdivided.

A. Umbilicate; comprising twenty-five species.

B. Imperforate; with the lips toothless; comprising eleven species.

C. Imperforate; with the lips toothed; comprising forty species.

The shells are generally minute, seldom exceeding the size of a pea; usually polished; often banded; the colours varying in the different species.

NERITOS, a mountain in the island of Ithaca, as also a small island in the Ionian sea, according to Mela. The word Neritos is often applied to the whole island of Ithaca, and Ulysses, the king of it, is called Neritus dux, and his ship Neritia navis.

NERIUM. Rose-bay. Oleander. In botany, a genus of the class pentandria, order monogynia. Corol twisted, the tube terminated by a lacerated down; follicles two, erect; seeds crowned with down. Nine species, all natives of India or Arabia. The following are those chiefly cultivated.

1. N. oleander. Common rose-bay, or oleander: rising with stalks eight or ten feet high; branches in triplets, round the principal stalk, with smooth bark, purplish in plants with red flowers, white in those with light green flowers; leaves in triplets round the stalks upon petioles, dark-green, rigid, acute; flowers at the end of the branches in large loose bunches, purple, crimson, or dirty white. A native of the Levant; and flowers in July and August.

In warm, dry summers this plant appears to great advantage, the flowers opening in considerable abundance; but in cold, moist seasons the flowers require a green or hot-house to bring them to perfection. It admits of many varieties.

2. N. odorum. Sweet-scented rose-bay, or oleander. Stalks shrubby, six or seven feet high, covered with a brown bark; leaves rigid, lanceolate, opposite, ternate, or alternate; flowers as in species 1, of a pale red, and musky scent. Indigenous to India; flowers from June to August.

3. N. antidysentericum. Oval-leaved rose-bay. Branched cross-armed; leaves ovate, pointed, petioled, opposite, flat, entire; flowers herbaceous or greenish-white, in short subterminating racemes. The wood is said to be a specific in dysenteries (whence its specific name), and is denominated in the dispensatories cortex profluvii, cortex conessi, and codago pala. See CONESSI CORTEX.

4. N. coronarium. Broad-leaved rose-bay. An elegant, branched shrub, four feet high, milky, with an ash-coloured bark; leaves elliptic, peduncles in pairs; two-flowered from the fork of the branches: the flowers handsome, but without scent; perianth green; tube of the corol greenish-yellow; border snow-white. A native of the East Indies; flowers most part of the summer.

All these plants may be increased by layers, cuttings, and root-suckers. The first is hardy, and only requires to be protected in severe winters; the others demand the assistance of the green-house or hot-house, excepting in the height of summer.

NERIUS, an usurer in Nero's age, so eager to get money, that he married as often as he could, and as soon destroyed his wives by poison to possess himself of their estates. (*Pers.*)

NERO (Claudius Domitius Cæsar), a celebrated Roman emperor, son of Caius Domitius Ahenobarbus and Agrippina, the daughter of Germanicus. He was adopted by the emperor Claudius, A. D. 50, and four years after he succeeded to him on the throne. The beginning of his reign was marked by acts of the greatest kindness, affability, and popularity. Being once desired to sign his name to a list of malefactors that were to be executed, he exclaimed, "I wish to heaven I could not write." These virtues were soon discovered to be artificial, and Nero displayed the propensities of his nature. He delivered himself from the sway of his mother, and at last ordered her to be assassinated. This unnatural act of barbarity was, however, applauded by the senate, and the people signified their approbation. Many of his courtiers shared the unhappy fate of Agrippina, and Nero sacrificed to his fury or caprice all such as obstructed his pleasure, or diverted his inclination. He also turned actor, and publicly appeared on the Roman stage in the meanest characters. The celebrity of the Olympian games attracted his notice. He passed into Greece, and was defeated in wrestling, but the flattery of the spectators adjudged him the victory, and Nero returned to Rome, attended by a band of musicians, actors, and stage dancers from every part of the empire. These amusements of the emperor were indeed innocent; his character was injured, and not the lives of the people. But his conduct soon became more abominable; he was publicly married to one of his eunuchs, and soon after celebrated his nuptials with one of his meanest catamites. But now his cruelty was more fully displayed; he sacrificed to his wantonness his wife Octavia Poppæa, and the celebrated writers Seneca, Lucan, Petronius, &c. The christians also did not escape his barbarity. Wishing to renew the dismal scene of Troy, he caused Rome to be set on fire in different places. The conflagration became soon universal, and during nine successive days the fire was unextinguished. All was desolation, and Nero was the only one who enjoyed the general consternation. He placed himself on the top of a high tower, and he sang on his lyre the destruction of Troy. The continuation of cruelty, debauchery, and extravagance, at last roused the resentment of the people. Many conspiracies were formed against him, but were generally discovered. The most dan-

gerous conspiracy was that of Piso, from which he was delivered by the confession of a slave. The conspiracy of Galba proved more successful; the conspirator, when informed that his plot was known to Nero, declared himself emperor. The unpopularity of Nero favoured his cause; he was acknowledged by all the Roman empire, and the senate condemned Nero to be dragged naked through the streets of Rome, and whipped to death, and afterwards to be thrown from the Tarpeian rock. Nero, by a voluntary death, prevented the execution of the sentence. He killed himself, A.D. 68, in the 32d year of his age, after a reign of 13 years and eight months. Rome was filled with acclamations at the intelligence, and the citizens, more strongly to indicate their joy, wore caps, such as were generally used by slaves, who had received their freedom. It is necessary to observe, that the name of Nero is even now used emphatically to express a barbarous and unfeeling oppressor.

Nero (Claudius), a Roman general, sent into Spain to succeed the two Scipios. He suffered himself to be imposed upon by Asdrubal, and was soon after succeeded by young Scipio. He was afterwards made a consul, and intercepted Asdrubal, who was passing from Spain into Italy with a large reinforcement for his brother Annibal. An engagement was fought near the river Metaurus, in which 56,000 of the Carthaginians were left dead in the field of battle, and great numbers taken prisoners, 207 B. C. Asdrubal, the Carthaginian general, was also killed, and his head cut off and thrown into his brother's camp by the conquerors.—The Claudian family assumed the surname of Nero, which, in the language of the Sabines, signifies strong and warlike.

Nero, an island in the East Indies, the second of the Banda islands.

NERTERIA, in botany, a genus of the class tetrandria, order digynia. Calyxless; corol funnel-form, four-cleft, superior; berry two-celled; seeds solitary. One species only; a new Grenada plant, with herbaceous stems, leaves opposite, heart orbicular, entire; flowers small, sessile, solitary, terminal, pale.

NERVA COCCEIUS, a Roman emperor after the death of Domitian, A. D. 96. He rendered himself popular by his mildness, his generosity, and the active part he took in the management of affairs. In his civil character he was the patron of good manners, of sobriety, and temperance. He made a solemn declaration that no senator should suffer death during his reign, and this he observed with such sanctity, that, when two members of the senate had conspired against his life, he was satisfied to tell them that he was informed of their wicked machinations. Yet, as envy and danger are the constant companions of greatness, the prætorian guards at last mutinied, and Nerva nearly yielded to their fury. Having at length been obliged to surrender to them some of his friends and supporters, the infirmities of his age obliged him to fix upon a successor. Trajan, a man of approved integrity, was the object of his choice, which was confirmed by the approbation of the people. He died on the 27th of July, A.D. 98, in his 72d year, and his successor showed every mark of respect for his merit and for his character. Nerva was the first Roman emperor who was of foreign extraction, his father being a native of Crete. (*Plin. Diod.*)—This name was also common to two consuls under the emperors Tiberius and Vespasian.

NERVE. (*nervus*, νευρον.) Formerly it meant a sinew. This accounts for the opposite meanings of the word nervous; which sometimes implies strong, sinewy; and sometimes weak and irritable. Nerves are long white medullary cords that serve for sensation. They originate from the brain and spinal marrow; hence they are distinguished into cerebral and spinal nerves, and are distributed upon the organs of sense, the viscera, vessels, muscles, and every part that is endowed with sensibility. The cerebral nerves are the olfactory, optic, motores oculorum, pathetici, or trochleatores, triginini, or divisi, abducent, auditory, or acoustic, par vagum, and lingual. Heister has drawn up the uses of these nerves in the two following verses:

Olfaciens, cernens, oculosque movens, patiensque,
Gustans, abducens, audiensque, vagansque, loquensque.

The spinal nerves are thirty pair, and are divided into eight pair of cervical, twelve pair of dorsal, five pair of lumbar, and five of sacral nerves. In the course of the nerves there are a number of knots; these are called ganglions: they are commonly of an oblong shape, and of a greyish colour, somewhat inclined to red, which is, perhaps, owing to their being extremely vascular. Some writers have considered these little ganglions as so many little brains. Lancisi fancied he had discovered muscular fibres in them, but they certainly are not of an irritable nature. A late writer (Dr. Johnson) imagines they are intended to deprive us of the power of the will over certain parts, as the heart, for instance; but if this hypothesis were well founded, they should be met with only in nerves leading to the involuntary muscles; whereas it is certain that the involuntary muscles receive nerves through ganglions. Dr. Munro, from observing the accurate intermixture of the minute nerves which compose them, considers them as new sources of nervous energy. The nerves, like the blood-vessels, in their course through the body, communicate with each other, and each of these communications constitute what is called a plexus, from whence branches are again detached to different parts of the body. The use of the nerves is to convey the principles of motion and sensibility to the brain from all parts of the system, and from the brain to every part of the system. The manner in which this operation is effected is not yet determined. The inquiry has been a constant source of hypothesis in all ages, and has

produced some ingenious ideas, and many erroneous positions, but without having hitherto afforded much satisfactory information. Some physiologists have considered a trunk of nerves as a solid cord, capable of being divided into an infinite number of filaments, by means of which the impressions of feeling are conveyed to the common sensorium. Others have supposed each fibril to be a canal, carrying a volatile fluid, which they term the nervous fluid. Those who contend for their being solid bodies, are of opinion that feeling is occasioned by vibration; so that, for instance, according to this hypothesis, by pricking the finger a vibration would be occasioned in the nerve distributed through its substance; and the effects of this vibration, when extended to the sensorium, would be an excital of pain; but the inelasticity, the softness, the connection, and the situation of the nerves are so many proofs that vibration has no share in the cause of feeling.

Nerves, however, in modern physiology, are generally regarded as bundles of fibres originating from the brain or spinal marrow: those of the local senses, as of sight, hearing, tasting, and smelling, from the former; while those of touch or general feeling arise from the latter, and communicate with it, by a most extensive ramification, over every part of the body. The brain and nerves, therefore, are the instruments of sensation and motion; and, as has lately been made to appear, of secretion; for although Mr. Brodie in a very ingenious paper, published as the *Croonian lecture* for 1811 in the Philosophical Transactions, has sufficiently proved that the motion of the heart does not depend directly on the power of the brain, but on that of the lungs, since the heart of many, perhaps of all quadrupeds, will continue to beat with its accustomed vigour and frequency for a long time after the animal has been pithed, or even decapitated, provided respiration be artificially continued to the lungs, the secretions do not appear to proceed: even the bladder ceases to act, and animal heat is no longer produced. See the article PHYSIOLOGY.

The brain and nerves have a strong resemblance to each other; and it is probable that they agree also in their composition. The chemists who have chiefly examined into the nature of this substance are M. M. Thouret and Fourcroy.

Brain has a soft feel, not unlike that of soap: its texture appears to be very close: its specific gravity is greater than that of water. When kept in close vessels so that the external air is excluded, it remains for a long time unaltered. Fourcroy filled a glass vessel almost completely with this substance, and attached to it a pneumatic apparatus; a few bubbles of carbonic acid gass appeared at first, but it remained above a year without undergoing any further change.

If exposed, however, to the atmosphere, it exhales in a few days, at a temperature of 60, a most detestable odour, becomes acid, assumes a green colour, and very soon a great quantity of ammonia makes its appearance in it.

Cold water does not dissolve any part of the brain or nervous material. But by trituration in a mortar, it forms, with water, a whitish-coloured emulsion, which appears homogeneous, may be passed through a filter, and the brain does not precipitate by rest. When this emulsion is heated to 145° a white coagulum is formed. The addition of a great quantity of water also causes a coagulum to appear, which swims on the surface, but the water still retains a milky colour. When sulphuric acid is dropped into the watery emulsion of brain, white flakes separate and swim on the surface, and the liquid becomes red. Nitric acid produces, in like manner, a yellow liquid. Alkohol separates a white coagulum from the emulsion after it has been mixed with it for some hours, which when dried has some resemblance to albumen.

For a table of the nerves, see the part on NEUTOLOGY in our treatise of ANATOMY. See, also, NERVOUS FLUID, and NERVOUS SYSTEM.

NE'RVELESS. *a.* (from *nerve.*) Without strength (*Dunciad*).

NERVINES. (*nervina*, from *nervus.*) Neurotics. Medicines that relieve disorders of the nerves.

NE'RVOUS. *a.* (*nervosus*, Latin.) 1. Well strung; strong; vigorous (*Pope*). 2. Relating to the nerves (*Harte*). 3. (In medical cant.) Having weak or diseased nerves (*Cheyne*).

NERVOUS FEVER. See FEBRIS NERVOSA.

NERVOUS FLUID. Nervous principle. The vascularity of the cortical part of the brain, and of the nerves themselves, their softness, pulpiness, and natural humid appearance, give reason to believe that between the medullary particles of which they are principally composed a fine fluid is constantly secreted, which may be fitted to receive and transmit, even more readily than other fluids do, all impressions which are made on it. It appears to exhale from the extremities of the nerves. The lassitude and debility of muscles from too great exercise, and the dulness of the sensorial organs from excessive use, would seem to prove this. It has no smell nor taste; for the cerebrine medulla is insipid and inodorous. Nor has it any colour; for the cerebrum and nerves are white. It is of so subtile a consistence as never to have been detected. Its mobility is stupendous, for in less than a moment, with the consent of the mind, it is conveyed from the cerebrum to the muscles, like the electric matter. Whether the nervous fluid be carried from the organ of sense in the sensorial nerves to the cerebrum, and from thence in the motory nerves to the muscles, cannot be positively affirmed, but may be proved. The constituent principles of this liquid are perfectly unknown, as they cannot be rendered visible by art, or proved by experiment. Upon making a ligature upon a nerve the motion of the fluid is interrupted, which proves that something corporeal flows

through it. It is therefore a weak argument to deny its existence because we cannot see it; for who has seen the matter of heat, oxygen, azot, and other elementary bodies, the existence of which no philosopher in the present day doubts? The electric matter, whose action on the nerves is very great, does not appear to constitute the nervous fluid; for nerves exhibit no signs of spontaneous electricity; nor can it be the magnetic matter, as the experiment of Glisson with the magnet demonstrates; nor is it oxygen, nor hydrogen, nor azot; for the first very much irritates the nerves, and the other two suspend their action. Girtanner, however, has warmly espoused the doctrine that the principle of muscular irritability is oxygen; while Humboldt has as warmly contended that it is chiefly or altogether the Galvanic *aura*. Upon the whole, it should seem that the nervous fluid is an element *sui generis*, which exists and is produced in the nerves only; hence, like other elements, it is a thing unascertained, and only to be known by its effects. The pulpous softness of some nerves, and their lax situation, does not allow them and the brain to act on the body and soul only by oscillation. Lastly, a tense chord, although tied, oscillates. The use of the nervous fluid is, 1. It appears to be an intermediate substance between the body and the soul, by means of which the latter thinks, perceives, and moves the muscles subservient to the will. Hence the body acts upon the soul, and the soul upon the body. 2. It appears to differ from the vital principle; for parts live and are irritable which want nerves, as bones, tendons, plants, and insects.

Nervous system. The nervous system, as the organ of sense and motion, is connected with so many functions of the animal economy, that the study of it must be of the utmost importance, and a fundamental part of the study of the whole economy. The nervous system consists of the medullary substance of the brain, cerebellum, medulla oblongata, and spinalis; and of the same substance continued into the nerves, by which it is distributed to many different parts of the body. The whole of this system seems to be properly distinguished into these four parts.

1. The medullary substance contained in the cranium and vertebral cavity; the whole of which seems to consist of distinct fibres, but without the smaller fibres being separated from each other by any evident enveloping membranes.

2. Connected with one part or other of this substance are, the nerves, in which the same medullary substance is continued, but here more evidently divided into fibres, each of which is separated from the others by an enveloping membrane derived from the *pia mater*.

3. Parts of the extremities of certain nerves, in which the medullary substance is divested of the enveloping membranes from the *pia mater*, and so situated as to be exposed to the action of certain external bodies, and perhaps so framed as to be affected by the action of certain bodies only: these are named the sentient extremities of the nerves.

4. Certain extremities of the nerves so framed as to be capable of a peculiar contractility; and, in consequence of their situation and attachments, to be, by their contraction, capable of moving most of the solid and fluid parts of the body. These are named the moving extremities of the nerves: they are commonly named moving or muscular fibres.

These several parts of the nervous system are every where the same continuous medullary substance which is supposed to be the vital solid of animals, so constituted in living animals, and in living systems only, as to admit of motions being readily propagated from any one part to every other part of the nervous system, so long as the continuity and natural living state of the medullary substance remains. In the living man there is a thinking substance, or mind, constantly present, and every phænomenon of thinking is to be considered as an affection or faculty of the mind alone. But this thinking part of man is so connected with the corporeal part of him, and particularly with the nervous system, that motions excited in this give occasion to thought, and thought, however occasioned, gives occasion to new motion in the nervous system. This mutual communication or influence is assumed with confidence as a fact: but the mode of it we do not understand, nor pretend to explain; and therefore are not bound to obviate the difficulties that attend any of the suppositions which have been made concerning it. The phænomena of the nervous system occur commonly in the following order. The impulse of external bodies acts upon the sentient extremities of the nerves; and this gives occasion to perception or thought, which, as first arising in the mind, is termed sensation. This sensation, according to its various modification, gives occasion to volition, or the willing of certain ends to be obtained by the motion of certain parts of the body; and this volition gives occasion to the contraction of muscular fibres, by which the motion of the part required is produced. As the impulse of bodies on the sentient extremities of a nerve does not occasion any sensation, unless the nerve between the sentient extremity and the brain be free, and as, in like manner, volition does not produce any contraction of muscles, unless the nerve between the brain and muscle be also free, it is concluded from both these facts, that sensation and volition, so far as they are connected with corporeal motions, are functions of the brain alone; and it is presumed, that sensation arises only in consequence of external impulse producing motion in the sentient extremities of the nerves, and of that motion's being thence propagated along the nerves to the brain; and, in like manner, that the will operating in the brain only, by a motion begun there, and propagated along the nerves, produces the contraction of muscles. From

what is now said we perceive more distinctly the different functions of the several parts of the nervous system, as distinguished in, 1. The sentient extremities seem to be particularly fitted to receive the impressions of external bodies; and, according to the difference of these impressions, and of the condition of the sentient extremity itself, to propagate along the nerves motions of a determined kind, which, communicated to the brain, give occasion to sensation. 2. The brain seems to be a part fitted for, and susceptible of, those motions with which sensation, and the whole consequent operations of thought, are connected; and thereby is fitted to form a communication between the motions excited in the sentient, and those in consequence arising in the moving extremities of the nerves, which are often remote and distant from each other. 3. The moving extremities are so framed as to be capable of contraction, and of having this contraction excited by motion propagated from the brain, and communicated to the contractible fibre. 4. The nerves, more strictly so called, are to be considered as a collection of medullary fibres, each enveloped in its proper membrane, and thereby so separated from every other, as hardly to admit of any communication of motion from any one to the others, and to admit only of motion along the continuous medullary substance of the same fibre, from its origin to the extremities, or contrarywise. From this view of the parts of the nervous system, of their several functions and communication with each other, it appears that the beginning of motion in the animal economy is generally connected with sensation: and that the ultimate effects of such motions are chiefly actions depending immediately upon the contraction of moving fibres, between which and the sentient extremities the communication is by means of the brain.

Nervous leaf, in botany, a nerved leaf. Quum vasa simplicissima absque ramulis extenduntur a basi versus apicem. Having vessels perfectly simple and unbranched, extending from the base towards the tip. As in plantago lanceolata. It is applied also to the stipule. Nervous, however, has other appropriate senses, and ought therefore to be exchanged for nerved, or altogether avoided.

NE'SCIENCE. *s.* (from *nescio*, Latin.) Ignorance; the state of not knowing (*Glanville*).

NESH. *a.* (neſe, Saxon.) Soft; easily hurt.

NESIS. (*νησις*, from *νεω*, *to gather up.*) In medicine, an accumulation of humours in any particular part.

NESS. 1. A termination added to an adjective to change it into a substantive, denoting *state or quality*: as *poisonous*, *poisonousness*; *lovely*, *loveliness*; from nyſſe, Saxon. 2. The termination of many names of places where there is a headland or promontory; from neſe, Saxon, *a nose of land*, or headland.

Ness (Loch), a lake in Invernessshire, 22 miles in length, and, for the most part, one in breadth. It is sheltered on the N. W. by the high mountains of Urquhart and Mealfourvoney, and edged with coppices of birch and oak.

Ness, a river of Scotland, which is the outlet of Loch Ness, and falls into the frith of Murray, below Inverness.

NESSE (Christopher), a native of Yorkshire, educated at St. John's college, Cambridge. When ejected from his church at Leeds, in 1662, he opened a school for ten years, and in 1675 came to London, where he preached to a dissenting congregation. He wrote the Christian's Walk and Work on Earth, 8vo; the Christian's Crown and Glory, 12mo; the History and Mystery of the Old and New Testament, 4 vols. folio, &c. He died 1705, aged 84.

NESSUS, a celebrated centaur, son of Ixion and the Cloud. He offered violence to Dejanira, whom Hercules had entrusted to his care, with orders to carry her across the river Evenus. (Vide Dejanira.) Hercules saw the distress of his wife from the opposite shore of the river, and immediately he shot a poisoned arrow, which struck the centaur to the heart. Nessus, as he expired, gave his tunic to Dejanira, assuring her that it had the power of calling a husband away from unlawful loves: Dejanira received it with pleasure, and this mournful present afterwards caused the death of Hercules. (Vide Hercules.)

NEST. *s.* (neſt, Saxon.) 1. The bed formed by the bird for incubation and feeding her young (*Deuteronomy*). 2. Any place where animals are produced. 3. An abode; place of residence (*Shakspeare*). 4. A warm close habitation (*Spenser*). 5. Boxes or drawers; little pockets or repositories.

To Nest. *v. n.* (from the noun.) To build nests (*Howel*).

NE'STEGG. *s.* (*nest* and *egg*.) An egg left in the nest to keep the hen from forsaking it. (*Hudibras*).

To NE'STLE. *v. n.* (from *nest*.) To settle; to harbour; to lie close and snug (*Bacon*).

To Nes'tle. *v. a.* 1. To house, as in a nest (*Donne*). 2. To cherish, as a bird her young (*Chapman*).

NE'STLING. *s.* (from *nestle*.) A bird just taken out of the nest.

Ne'stling. *Nidulans.* In botany, applied to seeds which lie loose in pulp or cotton, within a berry or other pericarp.

NESTOR, in fabulous history, a son of Neleus and Chloris, nephew to Pallas, and grandson to Neptune. He had eleven brothers, who were all killed, with his father, by Hercules. The conqueror spared his life, and placed him on the throne of Pylos. He married Eurydice, the daughter of Clymenes, or, according to others, Anaxilia, the daughter of Arreus. He early distinguished himself in the field of battle, and was present at the nuptials of Pirithous, when a bloody battle was fought between the Lapithæ and Centaurs. As king of Pylos and Messenia he led his subjects to the

Trojan war, where he distinguished himself among the rest of the Grecian chiefs, by eloquence, address, wisdom, justice, and an uncommon prudence of mind. After the Trojan war Nestor retired to Greece, where he enjoyed the peace and tranquillity due to his wisdom and his old age. The manner and the time of his death are unknown; the ancients are all agreed that he lived three generations of men, which length of time some suppose to be 300 years, though, more probably, only 90, allowing thirty years for each generation. He had two daughters, Pisidice and Polycaste; and seven sons, Perseus, Straticus, Aretus, Echephron, Pisistratus, Antilochus, and Trasimedes. Nestor was one of the Argonauts, according to Valerius Flaccus.

NESTOR, whose secular name is not known, was a native of Russia, and the earliest historian of the north. He was born in 1056 at Bielozero; and in the 19th year of his age he assumed the monastic habit in the convent of Petcherski at Kiof, and took the name of Nestor. He there made a considerable proficiency in the Greek language: but seems to have formed his style and manner rather from the Byzantine historians, Cedrenus, Zonarus, and Syncellus, than from the ancient classics. The time of Nestor's death is not ascertained; but he is supposed to have lived to an advanced age, and to have died about the year 1115.

His great work is his Chronicle, to which he has prefixed an introduction, which, after a short sketch of the early state of the world, taken from the Byzantine writers, contains a geographical description of Russia and the adjacent regions; an account of the Sclavonian nations, their manners, their emigrations from the banks of the Danube, their dispersion, and settlement in the several countries wherein their descendants are now established. He then enters upon a chronological series of the Russian annals, from the year 858 to about 1113. His style is simple and unadorned, such as suits a mere recorder of facts; but his chronological exactness, though it renders his narrative dry and tedious, contributes to ascertain the æra and authenticity of the events which he relates.

It is remarkable (says Mr. Coxe, from whom we have taken this narrative), that an author of such importance, whose name frequently occurs in the early Russian books, should have remained in obscurity above 600 years; and been scarcely known to his modern countrymen, the origin and actions of whose ancestors he records with such circumstantial exactness. A copy of his Chronicle was given in 1668 by prince Radzivil to the library of Konigsburgh, where it lay unnoticed until Peter the Great, in his passage through that town, ordered a transcript of it to be sent to Petersburgh. But it still was not known as the performance of Nestor: for when Muller in 1732 published the first part of a German translation, he mentioned it as the work of the abbot Theodosius of Kiof; an error which arose from the following circumstance: the ingenious editor, not being at that time sufficiently acquainted with the Sclavonian tongue, employed an interpreter, who, by mistaking a letter in the title, supposed it to have been written by a person whose name was Theodosius. This ridiculous blunder was soon circulated, and copied by many foreign writers, even long after it had been candidly acknowledged and corrected by Muller.

NESTORIANS, a sect of ancient christians, still said to be subsisting in some parts of the Levant; whose distinguishing tenet is, that Mary is the mother of God. They take their name from Nestorius bishop of Constantinople, whose doctrines were spread with much zeal through Syria, Egypt, and Persia.

One of the chief promoters of the Nestorian cause was Barsumas, created bishop of Nisibis, A.D. 435. Such was his zeal and success, that the Nestorians, who still remain in Chaldea, Persia, Assyria, and the adjacent countries, consider him alone as their parent and founder. By him Pherozes the Persian monarch was persuaded to expel those christians who adopted the opinions of the Greeks, and to admit the Nestorians in their place, putting them in possession of the principal seat of ecclesiastical authority in Persia, the see of Seleucia, which the patriarch of the Nestorians has always filled even down to our time. Barsumas also erected a school at Nisibis, from which proceeded those Nestorian doctors who in the fifth and sixth centuries spread abroad their tenets through Egypt, Syria, Arabia, India, Tartary, and China.

He differed considerably from Nestorius, holding that there are two persons in Jesus Christ, as well as that the Virgin was not his mother as God, but only as man.

The abettors of this doctrine refuse the title Nestorians; alleging that it had been handed down from the earliest times of the christian church.

In the tenth century the Nestorians in Chaldea, whence they are sometimes called Chaldeans, extended their spiritual conquests beyond Mount Imaus, and introduced the christian religion into Tartary, properly so called, and especially into that country called Karit, and bordering on the northern part of China. The prince of that country, whom the Nestorians converted to the christian faith, assumed, according to the vulgar tradition, the name of John, after his baptism, to which he added the surname of Presbyter, from a principle of modesty; whence it is said, his successors were each of them called Prester John, until the time of Gengis Kan. But Mosheim observes, that the famous Prester John did not begin to reign in that part of Asia before the conclusion of the eleventh century. The Nestorians formed so considerable a body of christians, that the missionaries of Rome were industrious in their endeavours to reduce them under the papal yoke. Innocent IV. in 1246, and Nicolas IV. in 1278, used their utmost efforts for this purpose, but without success.

Till the time of pope Julius III. the Nestorians acknowledged but one patriarch, who resided first at Bagdat, and afterwards at Mousul; but a division arising among them, in 1551, the patriarchate became divided, at least for a time, and a new patriarch was consecrated by that pope, whose successors fixed their residence in the city of Ormus, in the mountainous part of Persia, where they still continue, distinguished by the name of Simeon; and so far down as the last century these patriarchs persevered in their communion with the church of Rome, but seem at present to have withdrawn themselves from it. The great Nestorian pontiffs, who form the opposite party, and look with an hostile eye on this little patriarch, have, since the year 1559, been distinguished by the general denomination of Elias, and reside constantly in the city of Mousul. Their spiritual dominion is very extensive, takes in a great part of Asia, and comprehends also within its circuit the Arabian Nestorians, and also the christians of St. Thomas, who dwell along the coast of Malabar.

NESTUS, or Nessus, a small river of Thrace, rising in Mount Rhodope, and falling into the Ægean sea above the island of Thasos. It was for some time the boundary of Macedonia on the east.

NET. *s.* (*nati*, Gothic; net, Saxon.) 1. A texture woven with large interstices or meshes (*Taylor*). 2. Any thing make with interstitial vacuities (*Kings. Thomson*).

Net (Fishing). This is of various kinds; the chief are the drag-net, the flew, and the casting-net. The drag is a large net put into a pond, and drawn from one end of it to the other by men on each side, to get out all fish for the purpose of selecting the largest for stews, &c. and the smaller to stock other ponds.

The flew is of two kinds, the one for drawing, the other to be placed either as a stop to a drag-net, or to be set and left in a pond or river to intercept the fish. When fishing with flews, the common practice of disturbing the water by poles, &c. is very absurd. Pike, tench, and perch, will strike the flew more readily when the water is quite still, and carp hide themselves under the banks at the least noise. The casting-net is thrown from a person's shoulder, and requires great skill and dexterity in him who casts it, which can only be acquired by long practice; the great art is to spread it wide, and yet not throw it high in the air. If not thrown wide, so that the leads may form a large circle, few fishes will be surrounded by it; and if thrown high, which is the usual method employed by the unskilful to obtain a wide spread, the fish will be alarmed, and quit the place. If the pond be muddy, the net should be suffered to remain some minutes before it is drawn out, that the fishes may rise; for carp, especially when first alarmed, are apt to strike into the mud. Mr. Daniel observes, that a piece of crumb of bread, put into the stomach of either carp or tench, suspected to be tainted with mud, will absorb all the disagreeable taste, but should be taken out before they are sent to table.

Net, Neat, in commerce, something pure and unadulterated with any foreign mixture. Thus, wines are said to be net when not falsified or balderdashed; and coffee, rice, pepper, &c. are said to be net when the filth and ordures are separated from them. (See Neat.) A diamond is said to be net when it has no stains or flaws; a crystal when transparent throughout.

Net is also used for what remains after the tare has been taken out of the weight of any merchandise; i. e. when it is weighed clear of all package. (See Tare.) Thus we say a barrel of cochineal weighs 450 pounds; the tare is 50 pounds, and there remains net 400 pounds.

Net produce, a term used to express what any commodity has yielded, all tare and charges deducted. The merchants sometimes use the Italian words *netto proceduto*, for net produce.

NETE, in music, the name given by the ancient Greeks to the fourth, or most acute chord, of each of the three tetrachords which followed the two first, or deepest.

Nete diezeugmenon. (Greek.) In the ancient music, the final, or highest sound of the fourth tetrachord, and the first, or gravest of the fifth.

Nete hyperbolæon. The last sound of the hyperbolæon, or highest tetrachord, and of the great system, or diagram, of the ancient Greeks.

Nete synemmenon. (Greek.) The name by which the ancients distinguished the fourth, or most acute sound of the third tetrachord, when conjoint with the second.

NETHER. *a.* (neoðen, Sax. *neder*, Dutch.) 1. Lower; not upper (*Dryden*). 2. Being in a lower place (*Milton*). 3. Infernal; belonging to the regions below (*Dryden*).

NETHERLANDS, or Low Countries, a country of Europe, anciently called Gallia Belgica, 260 miles in length, and from 100 to 200 in breadth; bounded on the W. and N. by the German ocean, E. by Germany, and S. by France. In the ninth century, the sons of emperor Lewis the Pious having divided the dominions of their father, who possessed Germany, France, and Italy, a new kingdom was formed, comprehending Germany and France, and part of the Netherlands. It was called Lotharia, but did not long subsist; for it was soon divided into two: and that seated near the Mediterranean was called the kingdom of Burgundy; while the other, to the N. had the name of Austrasia. Neither did this last continue long; it being divided into seventeen provinces, under different names, exclusive of the territories of Liege and Upper Gelderland; but they still depended on the empire of Germany, and were called Lower Germany. In process of time the house of Burgundy purchased many of them, and was about to form them, with Burgundy, into a kingdom; but Charles the Bold, the last duke of Burgundy, being killed by the Swiss in 1477, his part of

the Netherlands devolved on Mary, his only child; by whose marriage with emperor Maximilian, the Netherlands were an acquisition to the house of Austria. Emperor Charles V. king of Spain, in 1555, abdicated the sovereignty of the Netherlands, and soon after the Spanish crown, in favour of his son Philip. The tyranny of this cruel bigot, Philip II. who endeavoured to introduce the inquisition into the Low Countries, with the barbarities exercised by the duke of Alva, exasperated the people to such a degree, that they threw off the Spanish yoke, and under the conduct of William I. prince of Orange, formed the famous league of Utretcht, in 1579, which proved the foundation of the Republic of the Seven United Provinces. After a long war (with the interval of a truce of twelve years) Philip IV. expressly acknowledged the independence of these provinces, by the treaty of Westphalia, in 1648. The other ten provinces, namely, Brabant, Antwerp, Malines, Namur, Limburg, Luxemburg, Hainault, Flanders, Artois, and Cambresis, returned under the dominion of Spain, but with very favourable stipulations with respect to their ancient liberties. On the accession of a branch of the house of Bourbon to the Spanish monarchy, it was stipulated, in 1714, that the Spanish Netherlands should return to the German branch of the house of Austria; but some considerable parts were obtained, by conquest or cession, by the French and Dutch. The Dutch had part of Brabant, Limburg, and Flanders: the French had Artois and Cambresis; with part of Hainault, Flanders, and Luxemburg. Austria held the rest; and the provinces of Antwerp and Malines were included under the name of Austrian Brabant. In 1788, emperor Joseph II. having projected many innovations, and enforcing them with violence, a universal spirit of revolt broke out, an army of 40,000 men rose, as if by magic, to support the renunciation of all allegiance, which several of the provinces openly made; a congress was formed from the different states, in whom the supreme government was vested; and by the end of 1789 the Austrians were expelled. The new government, however, was not of long duration; for Leopold II. (the successor of Joseph) was enabled, partly by conciliatory measures, and partly by the mediation of Great Britain, Prussia, and Holland, to recover the entire possession of his authority; the mediating courts having guarantied the restoration of the ancient Belgic constitution. In 1792 the French overran the Austrian Netherlands: they were driven out of the country in 1793; but they returned in 1794, and subdued every part of it; and in 1795 decreed it, with the territories of Liege and Upper Gelderland, an integral part of the French republic. To this country they gave the name of Belgium, and divided it into the following nine departments; Dyle, Forets, Jemappe, Lis, Meuse Lower, Nethes (Two), Ourthe, Sambre and Meuse, and Scheldt; which see. The Netherlands, or Belgium, is 170 miles long and 90 broad; bounded on the N. by Holland, E. by Germany, S. W. by France, N. W. by the German ocean. The principal rivers are the Scheldt, Meuse, Dyle, Sambre, and Lis; and there are many fine navigable canals. The air is temperate, and the soil extremely fertile; but the mouths of the rivers and harbours are frozen in winter. Brussels is the chief town. See HOLLAND, or DUTCH NETHERLANDS, and FRANCE.

NETHERMOST. *a.* (superlative of *nether.*) Lowest (*Milton*).

NETHES (Two), a new department of France, including the northern part of Austrian Brabant. It has its name from two rivers which rise on the east border, and unite their streams at Liere. The capital is Antwerp.

NETHINIMS, among the Jews, the posterity of the Gibeonites, who were condemned by Joshua to be hewers of wood and drawers of water for the house of God.

NETOPION. A name given by the ancients to a very fragrant and costly ointment, consisting of a great number of the finest spicy ingredients. Hippocrates, in his treatise of the Diseases of Women, frequently prescribes the netopion in diseases of the uterus; and in other places he speaks of its being poured into the ear as a remedy for deafness; these compositions, by their attenuating qualities, dividing the viscous and thick humours. The word netopion is also sometimes used to express the unguentum Ægyptiacum, and sometimes simply for oil of almonds.

NETTING. *s.* A reticulated piece of work.

NETTINGS, in a ship, a sort of grates made of small ropes, seized together with rope-yarn or twine, and fixed on the quarters and in the tops; they are sometimes stretched upon the ledges from the waste-trees to the roof-trees, and the top of the forecastle to the poop; and sometimes are laid in the waste of a ship, to serve instead of gratings.

NETTLE. See URTICA.

NETTLE (Dead). See LAMIUM.

NETTLE (Snowy), in botany. See URTICA.

NETTLE (Hemp) Tartarian. See URTICA.

NETTLE (Canada). See URTICA.

NETTLE-TREE. See CELTIS.

To NE'TTLE. *v. a.* (from the noun.) To sting; to irritate; to provoke (*Bentley*).

NETTLE-RASH, in medicine, a troublesome cutaneous eruption, of which Dr. Cullen forms the genus urticaria. The disease has its English name from the resemblance of its eruption to that made by the stinging of nettles. These little elevations upon the skin in the nettle-rash often appear instantaneously, especially if the skin be rubbed or scratched, and seldom stay many hours in the same place, and sometimes not many minutes. No part of the body is exempt from them; and where many of them rise together, and continue an hour or two, the parts are often considerably swelled; which particularly happens in the face, arms, and hands. These eruptions will continue to invest the skin, sometimes in one place and sometimes in another, for one or two

hours at a time, two or three times every day, or perhaps for the greatest part of the twenty-four hours. In some persons they last only a few days, in others many months; nay, sometimes the disease has lasted for years, with very short intervals.

But though the eruption of the urticaria resembles, as already observed, that produced by the stinging of nettles, it is sometimes accompanied with long wheals, as if the part had been struck with a whip. Whatever be the shape of these eminences they always appear solid, without having any cavity or head containing either water or any other liquor; and this affords an easy mark whereby this disease may be distinguished from the itch. For it often happens that the insufferable itching with which this eruption is attended, provokes the patient to scratch the parts so violently, that a small part of the cuticle on the top of these little tumors is rubbed off; a little scab succeeds; and, when the swelling is gone down, there is left an appearance hardly to be distinguished from the itch but by the circumstance just now mentioned. The nettle-rash also further differs from the itch in not being infectious.

Dr. Heberden is inclined to ascribe this disease to some mechanical cause outwardly applied to the skin. He observes, that most people suffer in a similar manner from the real stinging of nettles. Cowhage, a sort of phaseolus or French bean, the pod of which is covered over with a kind of down or hair, and the effect of which upon the skin is much the same as that of nettles; and almost any hairs cut equally short, and sprinkled upon the skin, whenever they happen to stick in it, will make the part itch or smart in such a manner as to give great uneasiness; it is also a considerable time before the skin can be cleared of the finer ones, when once they are strewed upon it.

Reaumer, in the fourth memoir of his History of Insects, describes a species of caterpillar to which belong a sort of hairs almost invisible to the naked eye, which are easily detached, and frequently float in the air round their nest, though it have not been at all disturbed. The touch of these hairs has a similar effect with the cowhage; that is, they occasion intolerable itchings, with little bumps and redness, arising sometimes to a slight inflammation. These he found would continue four or five days, if the animal or the nest had been much handled; and though they had not been touched at all, yet by only walking near their nests the same effects would be brought on, but for a shorter time. These hairs affect the skin in this manner by sticking in it, as he could perceive with a glass of a great magnifying power; for with one of a small power they are not visible. The uneasy sensations caused by these small wounds not only, as he says, last several days, but move from one part of the body to another; so that they will cease upon one wrist, and immediately begin on the other; from the wrist they will go to the fingers or the face, or even to the parts of the body which are covered. He supposes, that the motion of the body, where much of this fine down lies near or upon the skin, may drive it from one part to another, or change what was lying there inoffensively to a situation fit to make it penetrate into the skin. Neither cold water, nor oil, nor spirit of wine, with which the parts affected were bathed, had any effect in removing the itching. He thinks the most efficacious remedy which he tried for this complaint was, to rub the parts strongly with parsley, which instantly lessened the sensations, and after two or three hours entirely freed the patient from them. It is also well known that many species of caterpillars, by only walking over the hands, will produce something like this effect on the parts which they touch, and undoubtedly from the same cause.

Dr. Heberden asks, Is it impossible that the nettle-rash should arise from the same causes, or from others similar, which we miss by looking too deeply for them in the blood and humours? Such (says he) may have been its origin in some instances, where it has lasted only a few days; but where this affection has continued for some years, in persons who change their linen every day, and who bathe frequently all the time, it can hardly be ascribed to such an external cause. He has observed it frequently to arise from cantharides. But whatever be the cause, it seldom, if ever, requires internal medicines; and if the itching could be certainly and expeditiously allayed, there would be no occasion for any other cure.

Nettle-thread and paper. It has been long known that this weed may be advantageously employed for most of the purposes of hemp, flax, and cotton: and the luxuriance of its growth on the coarsest waste lands has naturally induced an idea that various articles of cloth and paper might be manufactured from it at a much cheaper price than can be obtained from any other vegetable. The Society of Œconomy at Haerlem, in 1803, offered a prize for the best memoir upon this subject; but we do not know the result. In our own country the subject has been well studied by Mr. Smith of Brentwood, Essex, and his attention to it has justly obtained for him the silver medal offered upon it by the very meritorious Society for the Encouragement of Arts, &c. established in London. He has transmitted to the society the following specimens of nettle products, which may be seen in the proper department.

Samples of the fibres, in their rough state, resembling different kinds of hemp and flax.

Samples of the fibres equal to the finest flax, and remarkably strong in texture.

Samples of very strong yarn, prepared from the coarsest fibres.

Samples of coarse paper, prepared from the rough refuse fibres.

Samples of the coarse fibres bleached white.

Samples of a coarse substance resembling cotton, prepared from the bleached coarse fibres.

Samples of white paper prepared by him from the last-mentioned substance.

Mr. Smith's process for preparing these articles, as described to the Society of Arts, is as follows:

The kind of nettle capable of being manufactured into cloth, &c. it is scarcely necessary to say,

is that which in general is denominated the stinging nettle. The most valuable sort, which many years practical experience has furnished me with a knowledge of, in regard to length, suppleness, fineness of the lint, brittleness of the reed, which dresses most freely, with less waste of fibre, and yields the greatest produce of long and fine strong harl, I have found growing in the bottom of ditches among briars, and in shaded valleys, where the soil has been a blue clay or strong loam, but from which situations I have selected some which have measured more than twelve feet in height, and upwards of two feet in circumference. Plants growing in the situations above described are in general from five to nine feet in height, and those growing in patches on a good soil, standing thick, and in a favourable aspect, will average in height about five feet and a half, will work kindly, and the stems are thickly clothed with lint. Those that grow in poorer soils, and in less favourable situations, with rough and woody stems, and have many lateral branches, run much to seed, are stubborn, and work less kindly; they produce lint more coarse, harsh, and thin. In every situation and different soil I have experienced the most productive nettles to be those which have the smoothest and most concave tubes, the largest joints, the fewest leaves, and which produce the least quantity of seed.

In gathering them, as they are perennial plants, I have preferred the mode of cutting them down instead of pulling them up by the roots. This I recommend to be the practice, with a view to obtain a second crop where the situations will allow of it, and to secure the propagation of them the subsequent year.

The most favourable time for collecting them is from the beginning of July to the end of August, but it may be continued even to the end of October, only the lint of those which remain growing to that time will be less supple, and will not work so freely; and if the season happens to be unfavourable, it is probable there would not be sufficient time to steep and grass them, in which case they should be dried by the heat of the atmosphere, or if the state of the weather would not permit of this, then by means of artificial heat; and when dried they should be housed or stacked till the spring, when they might successfully undergo the same operation of steeping as those of the first collection. Such as grow in grass fields, where the grass is intended for hay, should be cut when the hay is cut, in order to prevent their being spoiled by the cattle when feeding; the harls of which would be fine in quality, and well suited to be wrought up with the second crop, and which crop may be obtained after those of the first cutting, where the situation will admit of their being preserved. The fine quality of such I ascertained last autumn, and found the height of them to average three feet and a half; they were gathered the latter end of November. The following are the processes adopted by me.

After the nettles are gathered they should be exposed to the atmosphere till they gain some firmness, in order to prevent the skin from being damaged in the operations of dressing off the leaves, the lateral branches, and seeds. This should be done a handful at a time; and afterward they should be sorted, viz. those which are both long and fine by themselves, those which are both long and coarse by themselves, and those which are short and coarse by themselves; then made up into bundles as large as can be grasped with both hands, a convenient size for putting them into the water, and taking them out; a place for this purpose being previously prepared, either a pond or a pit free from mud, or a brook or river. The bundles should then be immersed, and placed aslant with the root end uppermost, and to prevent their floating on the surface some weight should be laid upon them.

The time required for steeping them is from five to eight days; but it is better they should remain rather too long in the water than too short a time, yet great care should be taken that they are not overdone. When the fibre approaches to a pulp, and will easily separate from the reed, and the reed becomes brittle and assumes a white appearance, this operation is finished.

The bundles should then be taken out singly, very carefully, to avoid damaging the fibres, and be rinsed as they are taken out of the water to cleanse them from the filth they may have contracted; they must then be strewed very thin upon the grass, and be gently handled. When the surface of them is become sufficiently dry, and the harl has obtained a degree of firmness, they should be turned repeatedly, till they are sufficiently grassed; the time required is known only by experience, so much depends on the state of the weather during the process; when they are sufficiently done, the harl blisters, and the stems become brittle; they must then be taken up and made into bundles, and secured from the weather.

The harl is now to be separated from the reed, after the manner practised on flax and hemp, either by manual labour, or machinery now in use in those manufactories. This operation was performed in my experiments by hand, and with implements constructed by myself, but which I consider too simple here to describe.

The harl being separated from the reed, it requires next to be beaten, that it may become more ductile for the operation of dressing, which may be performed with such implements as are used for dressing flax or hemp.

This operation being accomplished, the produce of the nettles is arrived at a state ready for spinning, and may be spun into various qualities of yarn, either by hand, or by machinery constructed for the purposes of spinning flax or hemp; and this yarn may be successfully substituted for the manufacturing every sort of cloth, cordage, rope, &c. which is usually made from hemp or flax, and is particularly calculated for making twine for fishing-nets equal to the Dutch twine imported for that purpose, the fibres of the nettles being stronger than those of flax, and not so harsh as the fibres of hemp.

In the course of my experiments on nettles it often occurred to me, that the refuse, and such parts as were damaged in the different processes, with the under-growth, might be applied to useful purposes, and in addition to the nettle manufactory, as applicable to the purposes for which hemp and flax are used. Another source of productive labour of great magnitude would be derived from a new substance, capable of being converted into so many beneficial uses, if my speculations should be finally accomplished. In contemplating these subjects, I was induced to believe the refuse and under-growth might be converted into paper of various sorts, according to the changes they might be made to undergo from the several operations necessary to reduce them to a proper state for this use; having frequently observed, with regret,

the deterioration in the quality of writing and printing paper, occasioned by the use of cotton rags in the paper-manufactory; which evinces itself even to the most superficial observer, who may only casually open many of the modern publications, and which must be admitted is of the utmost moment, as it endangers the preservation of works of literature. Being convinced of the superior strength of nettle substance, I thought, could my speculations be reduced successfully to practice, it would not only remedy this great evil, and operate as an antidote to the use of cotton rags in that part of the paper manufactory, but eventually effect a reduction in the prices of books, which for some years have been rapidly increasing, and are now become excessive, to the great obstruction of disseminating useful knowledge among mankind, and contribute to the diminution of our exports in that material branch of commerce.

In addition to the above incentives, the consideration of the high price of paper, chiefly occasioned, as I conclude, from the extravagant price of linen rags, and the impediments to the procuring a foreign supply of them, arising from the circumstances of the times; and seeing that the use of linen cloth is in a great measure superseded by the very general introduction of cloth manufactured from cotton, which consequently must materially diminish the supply of linen rags, and probably, in process of time, from the increasing substitution of cotton cloth for linen, linen rags, particularly of the finer qualities, may be totally annihilated. Urged by all these considerations, which were forcibly impressed on my mind, and feeling assured of the practicability of reducing the substance of nettles to a state necessary to the production of paper, and confident in the superior strength of such paper, if it could be manufactured from a substance so substantial, I was most powerfully impelled to attempt to reduce to practice what in theory I had so warmly cherished. The attempt was arduous, not only from an entire want of knowledge of the manufactory, and of the necessary utensils, but I was destitute of any proper implements to engage in the undertaking with any probability of success; hoping however by perseverance to succeed, I proceeded, and found on my first rough trial my expectations realized.

The most favourable condition of the lint, with a view to the paper manufactory, is to begin with it after it is hackled; in order that the fibres may be divested of the skins which enclose them, as, when it is intended to make white paper, having gone through that process, it would greatly facilitate the bleaching, and be the more easily disencumbered of the gross particles.

When I signify as my opinion that the fibres of nettles should be dressed the same as for yarn, previous to their being prepared with a view to the making of paper, I wish not to be understood to convey the idea that the operation cannot be dispensed with: because I conceive, that by the aid of such machinery as is in use with the paper manufacturers, or by some improvements therein, they might be brought to a pulp easily, even when the nettles are first gathered, should it, with a view to saving of labour, be deemed necessary; but the practicability of this I leave to the experience which time may hereafter afford.

My operation of bleaching the fibres for paper was performed on the grass, which I deemed preferable to the new mode of bleaching with water impregnated with air by means of oxigenated muriatic acid gass; because the old mode of bleaching on grass weakens the strength of the fibre, leaves it more flexible, and thereby expedites the maceration, which in some degree compensates for the time it requires longer than by the chemical process. But for bleaching of yarn or cloth made of whatever substance, the chemical process, if scientifically conducted, experience has convinced me is pre-eminently superior, as it gives additional strength to the yarn, greater firmness to the texture of the cloth, and is an immense saving of time, labour, &c.

After the lint is bleached it should be reduced to a proper length for paper, and then macerated in water after the manner of rags, and undergo similar processes till the substance is converted into paper, which may be easily accomplished by manufacturers, and the substance of nettles made to produce paper of the first quality and the most substantial.

We have no idea that these productions of the nettle can ever be brought to rival those of hemp, flax, or cotton, in an extensive market, any more than that the sugar of the maple-tree or the beet root can be made to vie with that of the sugar-cane; for we understand that, weight for weight, the quantity of any article produced from the nettle is far smaller than that obtained from the usual plants: but considering that the nettle grows abundantly all over Europe in wastes where few other vegetables or few other weeds will grow, it may always be had recourse to, now that a good method of working it appears pointed out, as a temporary substitute for hemp and flax in times of scarcity, and may have some effect in regulating their prices.

For the same reason we would advise an attention to the stalks of beans, and the bine or straw of hops: from both which very excellent materials for thread and paper may easily be obtained. The following mode of preparing which we extract from an ingenious paper of the rev. James Hall of Walthamstow, published in the Transactions of the Society of Arts.

Every bean-plant contains from 20 to 35 filaments, running up on the outside under the thin membrane from the root to the top. These, with a little beating, rubbing, and shaking, are easily separated from the strawy part, when the plant has been steeped ten or twelve days in water; or is damp, and in a state approaching to fermentation, or, what is commonly called, rotting. Washing and pulling it through hackles, or iron combs, first coarse, and then finer, is necessary to the dressing of bean-hemp; and so far as I have yet discovered, the easiest way of separating the filaments from the thin membrane that surrounds them.

From carefully observing the medium number of bean-plants in a square yard, in a variety of fields on both sides the Tweed, as well as in Ireland, and multiplying them by 4840, the number of square yards in an acre, and then weighing the hemp or filaments of a certain number of these stalks, I find that there are at a medium about 2cwt. of hemp, or these filaments, in every acre, admirably calculated for being converted into a thousand articles, where strength and durability is of importance, as well as, with a little preparation, into paper of all kinds; even that of the most delicate texture.

There are at least 200,000 acres of ticks, horse, and other beans planted in Great Britain and Ire-

land; and where there is not machinery for the purpose, the poor, both young and old, females as well as males, belonging to each of the 9700 parishes in England, &c. where beans are raised, might (hemp having risen of late from 60 to 120 pounds per ton), be advantageously employed in peeling, or otherwise separating these filaments from the strawy part of the plant, after the beans have been thrashed out.

When straw is to be steeped for bean hemp, the beans are to be thrashed in a mill: the beans should be put to the mill, not at right angles, but on a parallel, or nearly so, with the rollers, else the straw, particularly if the beans are very dry, is apt to be much cut. If the straw is not to be steeped, on putting the beans to be thrashed at right angles, or nearly so, with the rollers of the mill, a certain proportion of the fibres or hemp may easily be got from the straw, these being in general not so much cut as the straw; but often found torn off and hanging about it like fine sewing threads. The hemp thus taken off, though its lying under water for months would do it no harm, requires only to be steeped a few minutes, drawn through a hackle, and washed, previous to its being laid up for use. If the hemp or fibres, collected in this way (which is a fine light business for children, and such as are not able for hard work, and which requires no ingenuity), are intended only for making paper, they require neither steeping nor hacklings, but only to be put into parcels and kept dry till sent off to the manufacturer.

The straw of beans contains a saccharine juice, and is highly nutritive, perhaps more so than any other; and, like clover, the prunings of the vine, the loppings of the fig-tree, &c., produces a rich infusion, and uncommonly fine table-beer, as well as an excellent spirit by distillation. It is the hemp or fibres that prevents cattle from eating it. These, like hairs in human food, make cattle dislike it. The collection of it therefore should never be neglected, nor the boys and girls in workhouses and other places be permitted to be idle, while business of this kind would evidently tend both to their own and their employers' advantage.

It is a fact, that about the generality of mills for beating and dressing hemp and flax a large proportion, in some inland places, both of Great Britain and Ireland, amounting nearly to one half of what is carried thither, is either left there to rot, under the name of refuse, or thrown away as of no use, because too rough and short for being spun and converted into cloth. Now from the experiments I have tried, and caused to be tried, I have uniformly found that, though too rough and short for being converted into cloth, even of the coarsest kind, the refuse of hemp and flax, on being beat and shaken, so as to separate the strawy from the stringy particles, which can be done in a few minutes by a mill or hand-labour, as is most convenient, becomes thereby as soft and pliable, and as useful for making paper, as the longest, and what is reckoned the most valuable part of the plant, after it has been converted into cloth and worn for years.

In its natural state the refuse of hemp and flax is generally of a brown and somewhat dark colour. But by the application of a muriatic acid, oil of vitriol, or other cheap ingredient, well known to the chemists, as well as to every bleacher, such refuse, without being in the least injured for making paper, can in a few hours, if necessary, be made as white as the finest cambric.

There are, at a medium, published in London every morning 16,000 newspapers, and every evening about 14,000. Of those published every other day there are about 10,000. The Sunday's newspapers amount to about 25,000; and there are nearly 20,000 other weekly papers, making in all the enormous sum of 245,000 per week. At a medium twenty newspapers are equal to one pound—hence the whole amount to about three tons per week, or 260 tons per annum. But though this perhaps is not one half of the paper expended in London on periodical publications, and what may be called fugacious literature; and not one fourth part of what is otherwise consumed in printing-houses in the country at large; yet there are materials enough in the refuse of the hemp and flax raised in Britain and Ireland for all this and much more.

In like manner the bine or straw of hops contains an excellent hemp for making many articles, so also will it prove a most excellent material for making all kinds of paper. And it is a fact, that were even the one half of the bine of hops raised in the counties of Kent, Sussex, and Worcester, instead of being thrown away or burnt after the hops are picked, as is commonly done, steeped for ten or twelve days in water, and beaten in the same way as is done with hemp and flax, independent of what might be got from bean-hemp, and a variety of articles well known to the Society, there would be found annually materials enough for three times the quantity of paper used in the British dominions.

NETTUNO, a town of Italy, in Campagna di Roma, near the ruins of the ancient Antium, at the mouth of the Loracina, 24 miles S. by E. of Rome.

NETWORK. *s.* (*net* and *work*.) Any thing reticulated or decussated, at equal distances, with interstices between the intersections (*Shakspeare*).

NEVA, a river of Russia, which issues from the lake Ladoga, and flows to Petersburg, where it divides into several branches, and enters the gulf of Finland.

NEUBURG, a fortified town of Bavaria, capital of a principality of the same name. It stands on a hill, on the Danube, and has two gates, but the fortifications are chiefly gone to decay. The castle is a large building, and contains a hall of extraordinary size, embellished with portraits. It is 32 miles N.N.E. of Augsburg, and 60 S.W. of Amberg. Lon. 11. 13 E. Lat. 48. 43 N.

NEUBURG, a town of the palatinate of Bavaria, seated on the Schwarza, 17 miles E.S.E. of Amberg.

NEUCHATEAU, a town of France, in the department of Vosges; seated in a soil fertile in corn and good wine, on the river Meuse, 25 miles S.W. of Nancy.

NEUCHATEAU, a town of the Netherlands, in Luxemburg, 16 miles S.W. of Bastogne.

NEUCHATEL, a territory of Swisserland, which, with that of Vallengin, forms one principality, between the lake of Neuchatel and the borders of France; extending 36 miles from N. to S. and 18 in its greatest breadth. On the death of the duchess of Nemours, in 1707, the sovereignty of Neuchatel and Vallengin was claimed by Frederic I. of Prussia, as heir

to the prince of Orange; and his right was acknowledged by the states of the country, to whom he confirmed their privileges and alliances. In 1806 the king of Prussia ceded this principality to the French marshal Berthier, and the grant was confirmed by Napoleon. The inhabitants are protestants, except in the two districts of Landeron and Cressier, where the catholics are predominant. It is a hilly country, watered by several lakes and rivers. The soil is not equally fertile; but there are large vineyards that produce white and red wine, which last is excellent. The pastures on the mountains feed a great number of cattle, and there are plenty of deer in the forests.

Neuchatel, a lake of Swisserland, which stretches about twenty miles in length by four in breadth, from the town of Yverdun to that of Neuchatel, in a direction from S.W. to N.E. at which extremity it has a communication with the lake of Biel by a narrow outlet.

Neuchatel, a town of Swisserland, capital of a principality of the same name. It is situate partly on the plain between the lake of Neuchatel and the Jura, and partly on the side of that mountain. The chief article of exportation is wine, produced from the neighbouring vineyards, and much esteemed; and it has manufactures of printed linens and cottons. Many public works have been lately executed, among which are the new townhouse, and a superb causeway, leading toward the valley of St. Imier. Neuchatel is 25 miles N.E. of Lausanne, and 25 W. of Bern. Lon. 7. 0 E. Lat. 47. 5 N.

Neuchatel, a town of France, in the department of Lower Seine. It is noted for excellent cheese, and seated on the Argues, 20 miles S.E. of Dieppe.

NEVE (Timothy), of Wotton, near Ludlow, Shropshire, was educated at St. John's college, Cambridge. He kept a school at Spalding, and became successively canon of Peterborough, prebendary of Lincoln, archdeacon of Huntingdon, and rector of Alwalton, Huntingdonshire, where he died about 1740. He communicated, in 1727, to the Spalding society, of which he was the joint founder, an essay on the invention of printing, and on our first painters. His son Timothy was of Merton college, Oxford, and Margaret professor there. He died 1798, author of some sermons.

NEVER. *ad.* (*ne ever*, næfre, Saxon.) 1. At no time (*Pope*). 2. In no degree (*South*). 3. It seems, in some phrases to have the sense of an adjective. Not any (*Matthew*). 4. It is much used in composition: as *never*-ending, having no end.

NEVERN, a village of Wales, in Pembrokeshire, near a river of the same name, two miles N.E. of Newport. In the churchyard stands a square stone, 13 feet high and two broad; the top is circular, charged with a cross, and all the sides are carved with knot-work of various patterns.

NEVERS, a town of France, capital of the department of Nievre, and lately a bishop's see. It is built in the form of an amphitheatre, and contains several fine buildings; particularly the ancient ducal palace, in which John Casimir, king of Poland, expired in 1672. The chief manufactures are china, glass, and works of enamel. It is seated on the Loire, at the influx of the Nievre, over which is a handsome bridge, 15 miles N.N.W. of Moulins, and 145 S. by E. of Paris. Lon. 3. 9 E. Lat. 46. 59 N.

NEVERTHELESS. *a.* (*never the less.*) Notwithstanding (*Bacon*).

NEUHAUS, a town of Bohemia, in the circle of Bechin, with a castle, 27 miles E. by S. of Bechin.

Neuhaus, a town of Lower Saxony, in the duchy of Bremen, near the mouth of the Oste. It was once a place of great trade, but a sand bank arising in the harbour, at the entrance of the Oste into the Elbe, it is now much less frequented. It is 19 miles N.W. of Stade.

NEWHAUSEL, a town of Upper Hungary, seated in a marshy plain, on the river Neitra, 43 miles E.S.E. of Presburg.

NEVIS, one of the Leeward Caribbee islands in the West Indies, divided from the E. end of St. Christopher by a narrow channel. It has but one mountain, which is in the middle, very high, and covered with large trees up to the top. Here is a hot bath, much of the same nature as those of Bath, in England. It is a small island, but very fruitful, and subject to the English. The inhabitants amount to about 10,000; more than half of whom are blacks. Charleston is the capital, on the S.W. side, defended by a fort. Lon. 62 50 W. lat. 16 10 N.

NEVISAN (John), an Italian lawyer of Asti. He studied at Padua, and taught at Turin. His work Sylvæ Nuptiales, &c. 8vo. in which he asserts curious things, without order or connexion, was so offensive to the women of Turin, because he spoke with disrespect of the sex, that they drove him in disgrace with stones from the city, and would not suffer him to return before he entreated pardon on his knees. He died 1540.

NEUMÆ. (Lat.) A term applied by the old musicians to divisions upon a single vowel at the end of a psalm or anthem, as a recapitulation of the whole melody.

NEUMANN (Gaspar, M.D.), in biography, an eminent chemist, was born in 1683 at Zullichau, in the duchy of Crossen, in Brandenburgh, of which place his father was a burgher and apothecary. He was brought up to his father's profession, and in 1705 went to Berlin, where he engaged in the service of the king of Prussia. After having accompanied him in his journeys for some years he was allowed to study at the university of Halle, and was then sent at the king's expence to travel for experience in chemical knowledge. In 1711 he visited the German mines, and thence passed into Holland, where he attended the lectures of the illustrious Boerhaave. Thence he went to England, where the news of the death of his sovereign, in 1713, somewhat de-

ranged his plans. He again visited Holland, and in 1716 accompanied George I. king of England to Hanover. On repairing to Berlin, he obtained the friendship of Stahl, physician to Frederick-William, who procured an order for him to resume his travels at the expence of the court. He visited France and Italy, every where increasing his stock of scientific knowledge, and forming connexions with men of eminence. Upon his return to Berlin he was appointed court-apothecary; and when the king, in 1723, established a college of medicine and surgery in his capital, Neumann was nominated to the chair of chemistry. He received the degree of M.D. from Halle in 1727; and in that year travelled through Silesia and Moravia to Vienna, returning by Bohemia and the mining country of Saxony. His reputation now extended to the different countries of Europe, and he was elected a member of the Royal Society of London, of the Imperial Academy Naturæ Curiosorum, and of the Institute of Bologna. In 1734 he made a tour to the New Marche and Pomerania, where he discovered the true origin of osteocolla. He became dean of the college of Berlin in 1736, and died in that city in 1737. The works published by Dr. Neumann in his life-time consist chiefly of dissertations in the Latin language, inserted in the Philosophical Transactions of London, the Ephemerides Acad. Naturæ Curiosorum, and the Miscellanea Berolinensia, and of others in the German language published separately After his death two different copies of his Chemical Lectures were given to the public; one, in two editions, at Berlin and Dresden, from notes taken by one of his pupils, intermixed with compilations from different authors; the other by the booksellers of the Orphan Hospital of Zullichau, from papers in Newmann's own hand-writing: of this there have been two impressions, the first in a large form, the second in an abridgment; which last, however, consists of two volumes, quarto. From this Dr. Lewis has made an excellent English translation in two volumes, octavo, still further abridged, but better methodized, and enriched with notes. "Neumann's Lectures," says Dr. Lewis, "are a valuable magazine of chemical knowledge. The author, biassed by no theory, and attached to no opinions, has enquired by experiment into the properties and uses of the most considerable natural and artificial productions, and the preparation of the principal commodities which depend on chemistry; and seems to have candidly, and without reserve, communicated all he discovered." Such a work must retain its value, notwithstanding the great modern changes in chemical theory. (*Brit. Ency.*)

NEUMARK, a town of Transilvania, on the river Merisch, 56 miles N. of Clausenburg. Lon. 23. 35 E. Lat. 47. 19 N.

NEUMARK, a town of Bavaria, 30 miles N.N.W. of Ratisbon. Lon. 12. 25 E. Lat. 49. 18 N.

NEUMARK, a town of Silesia, in the principality of Breslaw, 15 miles W. by N. of Breslaw. Lon. 16. 42 E. Lat. 51. 5 N.

NEURADA. In botany, a genus of the class decandria, order decagynia. Calyx five-parted; petals five; capsule inferior, ten-celled, ten-seeded, prickly. One species only, a white, woolly herb, indigenous to Egypt and Arabia, with depressed stem, and axillary flowers.

NEURITICS. In pharmacy, medicines useful in disorders of the nerves.

NEUROGRAPHY, signifies a description of the nerves.

NEUROLOGY. (*neurologia*, νευρολογια; from νευρον, a nerve, and λογος, a discourse). The doctrine of the nerves. See NERVOUS SYSTEM, and ANATOMY.

NEUROPTERA. (from νευρον, a nerve, or chord, and πτερον, wing.) In zoology, the fourth order of the class insecta; thus ordinally characterised; wings reticulate, tail unarmed. It comprises seven species; for which, and their general character, see the articles ENTOMOLOGY and ZOOLOGY.

NEURO'SES. (*neurosis*, νευρωσις, from νευρον, a nerve.) Nervous diseases. The second class of Cullen's nosology is so called; it comprehends affections of sense and motion, disturbed; without either idiopathic pyrexia, or topical diseases.

NEURO'TOMY. *s.* (νευρον and τεμνω.) The anatomy of the nerves.

NEU'TER. *a.* (*neuter*, Latin; *neutre*, Fr.) 1. Indifferent; not engaged on either side. 2. (In grammar.) A noun that implies no sex. See GRAMMAR.

NEU'TER. *s.* One indifferent and unengaged (*Addison*).

NEUTRAL. *a.* (*neutral*, French.) 1. Indifferent; not engaged on either side (*Shaks.*). 2. Neither good nor bad (*Davies*). 3. Neither acid nor alkaline (*Arbuthnot*).

NEU'TRAL. *s.* One who does not act nor engage on either side (*Bacon*).

NEUTRAL SALTS. Secondary salts. Under the name of neutral or secondary salts are comprehended such matters as are composed of two primitive saline substances combined together. They are called neutral, because they do not possess the characters of acid or alkaline salts, which are primitive salts; such are Epsom salts, alum, nitre, &c. See SALTS.

NEUTRA'LITY. *s.* (*neutralité*, Fr.) 1. A state of indifference, of neither friendship nor hostility (*Addison*). 2. A state between good and evil (*Donne*).

NEUTRA'LIZATION, in chemistry, is the mutual destruction of the properties of two or more substances. It has been thus illustrated: if we take a given quantity of sulphuric acid diluted with water, and add it slowly to the solution of soda by little at a time, and examine the mixture after every addition, we shall find that for a considerable time it will exhibit the properties of an acid, reddening vegetable blues, and having a taste perceptibly sour. But these acid properties gradually diminish after every addition of the alkaline solution, and at last disappear altogether. If we still continue to add the soda, the mixture gradually acquires al-

kaline properties, converting vegetable blues to green, and manifesting an urinous taste. These properties become stronger and stronger the greater the quantity of the soda is which is added. Thus it appears that when sulphuric acid and soda are mixed together, the properties either of the one or the other preponderate according to the proportions of each; but that there are certain proportions, according to which, when they are combined, they mutually destroy or disguise the properties of each other, so that neither predominates, or rather so that both disappear. When substances thus mutually disguise each other's properties, they are said to neutralize one another. This property is common to a great number of bodies; but it manifests itself most strongly, and was first observed in the acids, alkalies, and earths. Hence the salts which are combinations of these different bodies received long ago the name of neutral salts.

NEUTRALLY. *ad.* (from *neutral.*) Indifferently; on either part.

NEUVILLE, a town of Swisserland, in the bishopric of Basle. It is governed by two burghermasters and a small and great council, each consisting of twenty-four members. It is seven miles S.S.W. of Bienne, and nine N.E. of Neuchatel.

NEUWIED, a flourishing commercial city of Germany, in the circle of Upper Rhine, capital of the principality of Wied. The number of inhabitants is between 6 and 7000: the Calvinist is the established religion, but all others are tolerated; and the Moravians, in particular, have here a very respectable settlement. Neuwied is 10 miles N.N.W. of Coblentz. Lon. 7. 25 E. Lat. 50. 32 N.

NEW. *a.* (*newyd*, Welsh; neop, Saxon; *neuf*, French.) 1. Not old; fresh; novel (*Burnet*). 2. Not being before (*Burnet*). 3. Modern; of the present time (*Temple*). 4. Different from the former (*Com. Prayer*). 5. Not antiquated; having the effect of novelty (*Pope*). 6. Not habituated; not familiar (*Hooker*). 7. Renovated; repaired, so as to recover the first state (*Bacon*). 8. Fresh after any thing (*Dryden*). 9. Not of ancient extraction (*Addison*).

New. *ad.* This is used in composition for newly: as *new*-blown (*Cowley*).

New Jersey tree. See Ceanothus.

New Forest, a forest in that part of Hampshire which lies between Southampton water and the river Avon. It is 20 miles in length, and 15 in breadth; and has advantages of situation, with respect to conveyance by water carriage, and vicinity to the dockyards, superior to every other forest; having in its neighbourhood several places for shipping timber. It was afforested by William the Conqueror, and was then 10 miles longer than it is now. His son William Rufus was killed in this forest by an arrow, shot by Walter Tyrrel, that accidentally glanced against a tree, the site of which is now pointed out by a triangular stone. The lord warden of this forest is appointed by letters patent, during the king's pleasure, and all the courts of jurisdiction are held at Lyndhurst.

New River, an artificial river of England, originally brought from Amwell, in Hertfordshire, to Islington, for the supply of the metropolis with water. It was finished in 1613, by sir Hugh Middleton, a citizen of London, who expended his whole fortune in the undertaking. It has since been carried up to a spring near Hertford, called Chadwell, where the stream is also increased by a cut from the river Lea. This river, with all its windings, is 42 miles in length, and is under the management of a corporation called the New River Company.

New Year Harbour, a good harbour on the N. coast of Staten Land. Lon. 64. 11 W. Lat. 54. 49 S.

New Year Islands, small islands near New Year Harbour, on the N side of Staten Land.

NEWARK, a town of New Jersey, capital of Essex county, with two churches and an academy. It is celebrated for its cider, and has a considerable manufacture of shoes. It stands on the W. side of Passaick river, near its mouth in Newark bay, nine miles W. of New York. Lon. 74. 18 W. Lat 40. 40 N.

Newark, a town of Upper Canada, on the W. side of the river Niagara, at its entrance into Lake Ontario, and opposite the town and fort of Niagara, 27 miles N. by E. of Fort Erie.

Newark upon Trent, a borough in Nottinghamshire, governed by a mayor, with a market on Wednesday. It is seated on the Trent, over which is a bridge, and once had a handsome castle, now in ruins. The church, reckoned one of the finest in the kingdom, was erected by Henry IV. Here, in the midst of troubles, died king John; and here Charles I, after his defeat at Naseby, put himself into the hands of the Scotch army, who afterwards gave him up to his worst enemies. Newark has about 7000 inhabitants, with a good trade, and is 17 miles N.E. of Nottingham, and 120 N. by W. of London. Lon. 0. 45 W. Lat. 53. 6 N.

NEWBOROUGH, or Gorey, a borough of Ireland, in the county of Wexford, 25 miles N. by E. of Wexford, and 47 S. of Dublin.

NEWBURGH, a town of Scotland, in Fifeshire, with a good harbour on the frith of Tay. Here the large vessels belonging to Perth unload their goods into lighters. The principal manufacture is linen. It is 10 miles S.E. of Perth, and 18 W. of St. Andrew.

Newburgh, a town of Wales, in the isle of Anglesey, governed by a mayor, with a market on Tuesday; 12 miles S.W. of Beaumaris, and 250 N.W. of London.

Newburg, a town of New York, in Ulster county, on the W. side of Hudson river. Ships of considerable burden may unload at the wharfs, and many vessels are built here. It is 32 miles S. of Kingston, and 54 N. of New York.

NEWBURY, a town of England, in the county of Berks; situated on the river Kennet,

which is made navigable to Reading; and a little below it joins the Thames. Newbury is said to have flourished on the decay of Speen, which now appears as a suburb. In the reign of Henry VIII, it was greatly celebrated for its manufacture of cloth. Orman John Winchcomb, called Jack of Newbury, employed 100 looms in his own house; and in the expedition of Floddenfield, marched against the Scots, with his men, armed and clothed at his own expence. Newbury is a town of considerable trade, with a large weekly market on Thursday. Near this town were two obstinate battles fought, at different times, between the royalists and the forces of the parliament, king Charles being present at them both; and both were fought almost upon the same spot of ground: the first on the 20th of September, 1643, and the other on the 27th of October, 1644. In the first of these battles the success was doubtful, and both sides claimed the advantage; in the last, the king's army had apparently the worst of it: fifty-one miles E. Bath, and fifty-six W. London. Lat. 51. 25 N. Lon. 1. 12 W.

NEWBURY PORT, a sea-port of United America, in the state of Massachusetts. The commerce with the West India islands is very considerable. Some vessels are employed in the freighting business, and a few in the fishery. In November, 1790, there were owned in this port six ships, forty-five brigantines, thirty-nine schooners, and twenty-eight sloops; in the whole eleven thousand eight hundred and seventy tons. A term of the courts of common pleas and general sessions is held here on the last Tuesday in September: thirty miles N. Boston. Lon. 70. 52 W. Greenwich. Lat. 42. 48 N.

NEWCASTLE, or NEWCASTLE UNDER LINE, a borough in Staffordshire, with a market on Monday. It had four churches, now reduced to one; and the castle, whence it had its name, is quite demolished. It has a manufacture of hats, is governed by a mayor, and sends two members to parliament. It is seated on a rivulet, 15 miles north of Stafford, and 149 N.N.W. of London. Lon. 2. 2 W. Lat. 53. 12 N.

NEWCASTLE, or NEWCASTLE UPON TYNE, a large borough and seaport in Northumberland, situate between the Picts Wall and the Tyne. The river is so deep, that ships under 400 tons burden may come up to the town, though the large colliers are stationed below, at Shields. The town may be considered as divided into two parts, of which Gate's-head, on the Durham side, is one; and both were joined by a stone bridge, which originally consisted of 12 arches; but by the embankment of the river to form the quays on the north side they were reduced to nine. In 1771, a dreadful flood carried away four of these arches, with some houses that stood upon them; and this part of the bridge was rebuilt in 1779. Through this place went part of that wall which extended from sea to sea, and was built by the Romans to defend the Britons against the incursions of the Picts. The town is defended by a strong wall, in which are seven gates, and as many turrets, with several casements bomb-proof; but the castle is old and ruinous. Here is a noble exchange: and the wall of the town running parallel with the river, leaves a spacious piece of ground between the water and the wall, which being faced with free-stone, forms the longest and largest quay in England, except that at Great Yarmouth. Here are four parish churches, besides one at Gate's-head. St. Nicholas' church stands on the top of a high hill, and has a lofty steeple of curious architecture. Among the other public buildings is a mansion-house for the mayor; a hall for the surgeons; a large hospital, built by the contribution of the keel-men, for the maintenance of the poor of their fraternity; and several charitable foundations. It is situate in the centre of the great collieries, which have for centuries supplied London, and most of the southern parts of the kingdom, with coal. This trade has been the source of great opulence to Newcastle; it also possesses manufactures of steel, iron, glass, and woollen cloth; and exports large quantities of lead, salt, salmon, butter, tallow, and grindstones. Ships are sent hence to the Greenland fishery. The streets in the old part of the town are narrow, and the buildings crowded together; but some of the newer parts are handsome and commodious. The suburbs are chiefly inhabited by keel-men; a rough and sturdy race, employed in carrying the coal down the river in keels, or lighters, to the large ships. Newcastle was made a borough by William I. and the first charter for digging coal was granted by Henry III. in 1239. It is 34 miles south of Alnwick, 94 north of York, and 271 north by west of London. Lon. 1. 27 W. Lat. 55. 3 N. In 1800, the number of houses was about 3400, of inhabitants 37,000. They are very active enterprizing people, with great attachment to literature and science: they have a very flourishing literary and philosophical society, with an excellent library, and extensive philosophical apparatus.

NEWCASTLE, a town of the United States, in Delaware. It was settled by the Swedes in 1627, and called Stockholm; afterward taken by the Dutch, and called New Amsterdam; and falling into the hands of the English, it was called Newcastle. It was the first town settled on the river Delaware, and is 35 miles S.W. of Philadelphia. Lon. 75. 38 W. Lat. 39. 37 N.

NEWCASTLE, a town of the United States, in Virginia, seated on the Pamunkey, a branch of York River, 40 miles N.W. of Williamsburg.

NEWCOMB (Thomas), son of a clergyman in Herefordshire, was educated at Corpus Christi college, Oxford. In 1734 he became rector of Stopham, Sussex, and afterwards lived at Hackney. He was author of various poems, and turned Hervey's Meditations into blank verse, and also the Death of Abel from the German. The school which he established at Hackney has long enjoyed celebrity.

NEWCOME (William), a prelate, born at

Abingdon, Berkshire, where his father was vicar. He was educated at the grammar-school of his native place, and elected to Pembroke college, Oxford. He was afterwards appointed tutor to Mr. Fox at Hertford college, and to this he was indebted for his elevation in the church. He became successively bishop of Ossory and Waterford, and was next translated to Armagh, by lord Fitzwilliam. This venerable prelate was a man of amiable manners, and was a scholar eminent for his extensive acquaintance with biblical knowledge. He died in Ireland, 1799, aged 70. His publications were very respectable, and particularly a letter to Dr. Priestley, on the Duration of our Lord's Ministry, 8vo.; Observations on our Lord's Conduct, 4to.; an improved Version of the 12 minor Prophets, 4to; another Version of Ezekiel, 4to.; Harmony of the Evangelists, Greek, folio; View of English Biblical Translations, 8vo. &c.

NEWEL, in architecture, is the upright post which a pair of winding stairs turn about; this is properly a cylinder of stone, which bears on the ground, and is formed by the end of the steps of the winding stairs.

NEWFA'NGLED. *a.* (*new* and *fangle.*) Formed with vain or foolish love of novelty (*Shakspeare*).

NEWFA'NGLEDNESS. NEWFA'NGLENESS *s.* (from *newfangled.*) Vain and foolish love of novelty (*Sidney*).

NEWFOUNDLAND, a large island on the E. coast of N. America, between 47 and 52° N. lat. Its form is triangular; the N. point is separated from Labrador by the strait of Belleisle, and from this apex it is 350 miles in length to the base, which is 200 in breadth. It is a mountainous, woody country, and very cold, being covered with snow five months in the year. It seems to have no inhabitants of its own, but in the summer time is visited by the Esquimaux Indians. It has several bays and harbours, and there are about 500 English families, who continue here all the year, beside the garrison of St. John's, Placentia, and other forts. In the fishing season, which begins in May and ends in September, it is resorted to by at least 10,000 people, on account of the great fishing-banks to the S.E. of this island; for here they cure the cod, which is carried not only to England, but to all parts of Europe and the West Indies. In winter, the chief employment of the inhabitants is to cut wood; and the smallest kind, used for fuel, is drawn by their large dogs, trained up and harnessed for that purpose. There is great plenty of game, fish, and fowl, but very little corn, fruit, or cattle. St. John's is the principal settlement.

NEWHAVEN, a town of Sussex, at the mouth of the river Ouse, with a quay on the E. side. It is seven miles S. by E. of Lewes, and 56 S. of London. Lon. 0. 5 E. Lat. 50. 48 N.

NEWHAVEN, a town of the United States, in Vermont, 25 miles N. of Bennington. Lon. 73. 8 W. Lat. 44. 6 N.

NEWHAVEN, a town of the United States, in Connecticut, with a university, consisting of one college, called Yale College. It carries on a considerable trade with New York and the West India islands; and lies round the head of a bay, four miles N. of the Sound, and 132 N.N.E. of New York. Lon. 72. 58 W. Lat. 41 17 N.

NE'WING. *s.* Yest or barm (*Ainsworth*).

NE'WLY. *ad.* (from *new.*) 1. Freshly; lately (*Dryden*). 2. In a manner different from the former (*Spenser*).

NEWMARKET, a town partly in Cambridgeshire, and partly in Suffolk, with a market on Thursday. It has one parish in each county, but all the town is in Suffolk. It is the most celebrated place in England for horse-races; and here Charles II. built a house for the sake of this diversion. It is 14 miles E. of Cambridge, and 60 N. by E. of London. Lon. 0. 25 E. Lat. 52. 20 N.

NE'WNESS. *s.* (from *new.*) 1. Freshness; lateness; recentness; state of being lately produced (*Raleigh*). 2. Novelty; unacquaintance (*South*). 3. Something lately produced (*Dryden*). 4. Innovation; late change (*Shakspeare*). 5. Want of practice (*Sidney*).

NEWNHAM, a corporate town in Gloucestershire, with a market on Friday. It is governed by a mayor, and seated on the Severn, eight miles S.W. of Gloucester, and 112 W.N.W. of London. Lon. 2. 23 W. Lat. 51. 46 N.

NEWPORT, a borough in the isle of Wight, with a market on Wednesday and Saturday. It is governed by a mayor, and sends two members to parliament. It is seated on the river Cowes, which is navigable for small vessels, 17 miles S. by E. of Southampton, and 91 S.W. of London. Lon. 1. 15 W. Lat. 50. 40 N.

NEWPORT, a borough in Cornwall, which has no market, but sends two members to parliament. It is three miles N. of Launceston, and 214 W. by S. of London. Lon. 4. 36 W. Lat. 50. 43 N.

NEWPORT, a town in Shropshire, with a market on Saturday, and a handsome free-school, 17 miles E. of Shrewsbury, and 140 N.W. of London. Lon. 2. 18 W. Lat. 52. 45 N.

NEWPORT, a town in Monmouthshire, with a market on Saturday, seated on the river Usk, over which is a bridge. It is walled round, and was formerly defended by a castle, considerable remains of which are yet in being. Near it are the vestiges of a camp. It stands 19 miles S.S.W. of Monmouth, and 152 W. by N. of London. Lon. 3. 4 W. Lat. 51. 36 N.

NEWPORT, a corporate town in Pembrokeshire, with a market on Saturday, and the ruins of a castle. It is governed by a mayor, and seated at the foot of a high hill, at the bottom of a bay of the same name, 18 miles N.E. of St. David's, and 235 W.N.W. of London. Lon. 4. 50 W. Lat. 52. 6 N.

NEWPORT, a seaport of the United States,

in Rhode Island. Its harbour is one of the finest in the world; and to the W. of the town is Goat Island, on which is a fort. Newport has a handsome state-house and an elegant public library. It is 80 miles N.E. of New York. Lon. 71. 6 W. Lat. 41. 35 N.

NEWPORT PAGNEL, a town in Buckinghamshire, with a market on Saturday. It has a manufacture of bonelace, and is seated on the Ouse, 14 miles E.N.E. of Buckingham, and 51 N.N.W. of London. Lon. 0. 43 W. Lat. 52. 4 N.

NEWPORT PRATT, a seaport of Ireland, situate near the mouth of a river which runs into Clew Bay, eight miles W. of Castlebar. Lon. 9. 21 W. Lat. 53. 53 N.

NEWRY, a borough of Ireland, in the county of Down, situate on the side of a steep hill, at the foot of which is Newry-water, having over it two stone bridges; and there is a third bridge over a navigable canal, by which it has a communication with Lough Neagh and Carlingford Bay. It has suffered greatly by the rebellions in Ulster, and was burnt by the duke of Berwick in 1689; but it is now so much improved in trade and buildings, that it is the largest town in the county. It is 49 miles N. of Dublin. Lon. 6. 20 W. Lat. 54. 15 N.

NEWRY-WATER, a river of Ireland, which separates the counties of Armagh and Down, and watering Newry, enters Carlingford Bay.

NEWS. *s.* (from *new*; *nouvelles*, Fr.) 1. Fresh account of any thing (*Waller*). 2. Something not heard before (*L'Estrange*). 3. Papers which give an account of the transactions of the present times (*Pope*).

NEWS-MONGER. *s.* (*news* and *monger.*) One that deals in news; one whose employment is to hear and to tell news (*Shaks.*).

NEWS-PAPERS, periodical publications, daily, weekly, &c. for the purpose of communicating to the world every thing of importance, whether political or literary, &c. which is going on. They have tended much to the dissemination of learning, and have served many other valuable purposes; and while they are carried on with candour, impartiality, and ability, they are unquestionably a great national benefit. When this, however, is not the case, and it often happens, they disgrace their first authors, and are highly injurious to the public. They were first published in England, August 22, 1642. Journal des Savans, a French paper, was first published in 1665, though one was printed in England, under the title of the Public Intelligencer, by sir Roger L'Estrange, 1663, which he dropped, on the publication of the first London Gazette. Newspapers and pamphlets were prohibited by royal proclamation 1680. Though at the revolution prohibitions of this kind were done away, and the press set at liberty, yet newspapers were afterwards made objects of taxation, and for this purpose were first stamped 1713. The number of them, however, gradually increased; and there were printed in the whole kingdom during the years 1775, 12,680,000; 1776, 12,830,000; 1777, 13,150,642; 1778, 13,240,059; 1779, 14,106,842; 1780, 14,217,371; 1781, 14,397,620; 1782, 15,272,519. They are now far more numerous.

Newspapers, or as they were first called in England *Diurnalls*, had been established a very short time before they were prostituted to serve a party, and to impose upon the public. This we learn from Mrs. Hutchinson's very interesting memoirs of her husband, colonel Hutchinson. When describing the conduct of sir John Gell, of Derbyshire, she says, "This man kept the diurnall makers in pension, so that whatever was done in the neighbouring counties against the enemy was attributed to him; and thus he hath indirectly purchased himselfe a name in story, which he never merited." "Some who knew him well, sayd he was not valliant, though his men once held him up among a stand of pikes, while they obtained a glorious victory, when the earl of Northampton was slaine: certaine it is he was never by his good will in a fight, but either by chance or necessity; and that which made his courage the more questioned was, the care he tooke and the expence he was att, to get it weekly mentioned in the diurnalls, so that when they had nothing elce to renoune him for, they once put in that the troops of that valliant commander sir John Gell tooke a dragoon with a plush doublet. Mr. Hutchinson, on the other side, that did well for virtue's sake, and not for the vaine glory of it, never would give aniething, to buy the flatteries of those scribblers, and when one of them once, while he was in towne, made mention of something done at Nottingham with falsehood, and had given Gell the glory of an action in which he was not concerned, Mr. Hutchinson rebuked him for it; whereupon the man begged his pardon, and told him he would write as much for him the next weeke; but Mr. Hutchinson tolde him he scorned his mercenary pen, only warned him not to dare to lie in any of his concernments, whereupon the fellow was awed, and he had no more abuse of that kind." Memoirs of Col. Hutchinson, p. 108.

NEWSHAM, a village in Durham, situate on the Tees, five miles from Darlington. This being the usual ford over the river from the S., the bishop of Durham is met here, at his first coming to the see, when the lord of Stockbourn, just below it, being at the head of the country gentlemen, advances into the middle of the river, with his truncheon, and presents it to the bishop, who returns it, and is then conducted along amid the acclamations of the populace. Here was formerly a nunnery.

NEWT, or EFT, in amphibiology. See LACERTA.

NEWTON (Sir Isaac), in biography, one of the greatest philosophers and mathematicians the world has produced, was born at Woolstrop, in Lincolnshire, on Christmas Day, 1642. He was descended from the eldest branch of the family of sir John Newton, bart. who were lords of the

manor of Woolstrop, and had been possessed of the estate for about two centuries before; to which they had removed from Westley, in the same county; but originally they came from the town of Newton, in Lancashire.

Other accounts say, probably with more truth, that he was the only child of Mr. John Newton, of Colesworth, near Grantham, in Lincolnshire, who had there an estate of about 120*l.* a year, which he kept in his own hands. His mother was of the ancient and opulent family of the Ayscoughs, or Askews, of the same county. Our author losing his father while he was very young, the care of his education devolved on his mother, who, though she married again, did not neglect to improve by a liberal education the promising genius that was observed in her son. At twelve years of age, by the advice of his maternal uncle, he was sent to the grammar-school at Grantham, where he made a good proficiency in the languages, and laid the foundation of his future studies. Even here was observed in him a strong inclination to figures and philosophical subjects. One trait of this early disposition is told of him: he had then a rude method of measuring the force of the wind blowing against him, by observing how much further he could leap in the direction of the wind, or blowing on his back, than he could leap the contrary way, or opposed to the wind; an early mark of his original infantine genius.

After a few years spent here, his mother took him home; intending, as she had no other child, to have the pleasure of his company; and that, after the manner of his father before him, he should occupy his own estate.

But instead of attending to the markets, or the business of the farm, he was always studying and poring over his books, even by stealth, from his mother's knowledge. On one of these occasions his uncle discovered him one day in a hay-loft at Grantham, whither he had been sent to the market, working a mathematical problem; and having otherwise observed the boy's mind to be uncommonly bent upon learning, he prevailed upon his sister to part with him; and he was accordingly sent, in 1660, to Trinity college, in Cambridge, where his uncle, having himself been a member of it, had still many friends. Isaac was soon taken notice of by Dr. Barrow, who was at this time appointed the first Lucasian professor of mathematics; and observing his bright genius, contracted a great friendship for him. At his commencement, Euclid was first put into his hands, as usual; but that author was soon dismissed, seeming to him too plain and easy, and unworthy of taking up his time. He understood him immediately as he read him; and a cast of his eye upon the contents of his theorems was sufficient to make him master of them: and as the analytical method of Des Cartes was then much in vogue, he particularly applied to it, and Kepler's optics, &c. making several improvements on them, which he entered upon the margins of the books as he went on, as his custom was in studying any author.

Thus he was employed till the year 1664, when he opened a way into his new method of Fluxions and Infinite Series; and the same year took the degree of Bachelor of Arts. In the mean time observing, that the mathematicians were much engaged in the business of improving telescopes, by grinding glasses into one of the figures made by the three sections of a cone, upon the principles then generally entertained, that light was homogeneous, he set himself to grinding optic glasses, of other figures than spherical, having as yet no distrust of the homogenous nature of light; but not hitting presently upon any thing in this attempt to satisfy his mind, he procured a glass prism, that he might try the celebrated phenomena of colours, discovered by Grimaldi not long before. He was much pleased at first with the vivid brightness of the colours produced by this experiment; but after a while, considering them in a philosophical way, with that circumspection which was natural to him, he was surprised to see them in an oblong form, which, according to the received rule of refraction, ought to be circular. At first he thought the irregularity might possibly be no more than accidental; but this was what he could not leave without further inquiry: accordingly he soon invented an infallible method of deciding the question, and the result was his New Theory of Light and Colours.

However, the theory alone, unexpected and surprising as it was, did not satisfy him; he rather considered the proper use that might be made of it for improving telescopes, which was his first design. To this end, having now discovered that light was not homogeneous, but an heterogeneous mixture of differently refrangible rays, he computed the errors arising from this different refrangibility; and, finding them to exceed some hundreds of times those occasioned by the circular figures of the glasses, he threw aside his glass works, and began to consider the subject with precision. He was now sensible that optical instruments might be brought to any degree of perfection desired, in case there could be found a reflecting substance which could polish as finely as glass, and reflect as much light as glass transmits, and the art of giving it a parabolical figure he also attained; but these at first seemed to him very great difficulties; nay, he thought them almost insuperable, when he further considered, that every irregularity in a reflecting superficies makes the rays stray five or six times more from their due course than the like irregularities in a refracting one.

Amidst these speculations, he was forced from Cambridge, in 1665, by the plague; and it was more than two years before he made any further progress in the subject. However, he was far from passing his time idly in the country; on the contrary, it was here, at this time, that he first started the hint that gave rise to the system of the world, which is the main subject of the Principia. In his retirement he was sitting alone in a garden, when some apples falling from a tree led his thoughts towards the subject of gravity; and, reflecting on the power of that principle, he began to consider, that, as this power is not found to be sensibly diminished at the remotest distance from the centre of the earth, to which we can rise, neither at the tops of the loftiest buildings, nor on the summits of the highest mountains, it appeared to him reasonable to conclude, that this power must extend much further than is usually thought.—"Why not as high as the moon?" said he to himself; "and if so, her motion must be influenced by it; perhaps she is retained in her orbit by it: however, though the power of gravity is not sensibly weakened in the little change of distance at which we can place ourselves from the centre of the earth, yet it is very possible that, at the height of the moon, this power may differ in strength much from what it is here." To make an estimate of what might be the degree of this

diminution, he considered with himself, that if the moon be retained in her orbit by the force of gravity, no doubt the primary planets are carried about the sun by the like power; and by comparing the periods of the several planets with their distances from the sun, he found, that if any power like gravity held them in their courses, its strength must decrease in the duplicate proportion of the increase of distance. This he concluded, by supposing them to move in perfect circles, concentric to the sun, from which the orbits of the greatest part of them do not much differ. Supposing, therefore, the force of gravity, when extended to the moon, to decrease in the same manner, he computed whether that force would be sufficient to keep the moon in her orbit.

In this computation being absent from books, he took the common estimate in use among the geographers and our seamen, before Norwood had measured the earth, namely, that sixty miles make one degree of latitude; but as that is a very erroneous supposition, each degree containing about sixty-nine and one third of our English miles, his computation upon it did not make the power of gravity, decreasing in a duplicate proportion to the distance answerable to the power which retained the moon in her orbit whence he concluded, that some other cause must at least join with the action of the power of gravity on the moon. For this reason he laid aside for that time any further thoughts upon the matter. Mr. Whiston (in his Memoirs, p. 33) says, he told him that he thought Des Cartes's vortices might concur with the action of gravity.

Nor did he resume this enquiry on his return to Cambridge, which was shortly after. The truth is, his thoughts were now engaged upon his newly projected reflecting telescope, of which he made a small specimen with a metallic reflector spherically concave. It was but a rude essay, chiefly defective in the want of a good polish for the metal. This instrument is now in the possession of the Royal Society. In 1667 he was chosen fellow of his college, and took the degree of master of arts. And in 1669, Dr. Barrow resigned to him the mathematical chair at Cambridge, the business of which appointment interrupted, for a while, his attention to the telescope; however, as his thoughts had been for some time chiefly employed upon optics, he made his discoveries in that science the subject of his lectures for the first three years after he was appointed mathematical professor: and having now brought his theory of light and colours to a considerable degree of perfection, and having been elected a fellow of the Royal Society, in January 1672, he communicated it to that body, to have their judgment upon it; and it was afterwards published in their Transactions, viz. of February 19, 1672. This publication occasioned a dispute upon the truth of it, which gave him so much uneasiness, that he resolved not to publish any thing further for a while upon the subject; and in that resolution he laid by his optical lectures, although he had prepared them for the press. And the analysis by infinite series, which he had intended to subjoin to them, unhappily for the world, underwent the same fate, and for the same reason.

In this temper he resumed his telescope; and observing that there was no absolute necessity for the parabolic figure of the glasses, since, if metals could be ground truly spherical, they would be able to bear as great apertures as men could give a polish to, he completed another instrument of the same kind. This answering the purpose so well, as, though only half a foot in length, to show the planet Jupiter distinctly round, with his four satellites, and also Venus horned, he sent it to the Royal Society, at their request, together with a description of it, with further particulars; which were published in the Philosophical Transactions for March, 1672. Several attempts were also made by that society to bring it to perfection; but for want of a proper composition of metal, and a good polish, nothing succeeded, and the invention lay dormant till Hadley made his Newtonian telescope in 1723. At the request of Leibnitz, in 1676, he explained his invention of infinite series, and took notice how far he had improved it by his method of fluxions, which however he still concealed, and particularly on this occasion, by a transposition of the letters that made up the two fundamental propositions of it, into an alphabetical order; the letters concerning which are inserted in Collins's "Commercium Epistolicum," printed 1712. In the winter, between the years 1676, and 1677, he found out the grand proposition, that, by a centripetal force acting reciprocally as the square of the distance a planet must revolve in an ellipsis, about the centre of force placed in its lower focus, and, by a radius drawn to that centre, describe areas proportional to the times. In 1680 he made several astronomical observations upon the comet that then appeared; which, for some considerable time, he took not to be one and the same, but two different comets; and upon this occasion several letters passed between him and Mr. Flamsteed.

He was still under this mistake, when he received a letter from Dr Hook, explaining the nature of the line described by a falling body, supposed to be moved circularly by the diurnal motion of the earth, and perpendicularly by the power of gravity. This letter put him upon enquiring anew what was the real figure in which such a body moved; and that enquiry convincing him of another mistake which he had before fallen into concerning that figure, induced him to resume his former thoughts with regard to the moon, and Picart having not long before, viz. in 1679, measured a degree of the earth with sufficient accuracy, by using his measures, that planet appeared to be retained in her orbit by the sole power of gravity; and, consequently, that this power decreases in the duplicate ratio of the distance; as he had formerly conjectured. Upon this principle he found the line described by a falling body to be an ellipsis, having one focus in the centre of the earth. And finding by this means that the primary planets really moved in such orbits as Kepler had supposed, he had the satisfaction to see that this enquiry, which he had undertaken at first out of mere curiosity, could be applied to the greatest purposes. Hereupon he drew up about a dozen propositions, relating to the motion of the primary planets, round the sun, which were communicated to the Royal Society in the latter end of 1683. This coming to be known to Dr. Halley, that gentleman, who had attempted the demonstration in vain, applied, in August, 1684, to Newton, who assured him that he had absolutely completed the proof. This was also registered in the books of the Royal Society; at whose earnest solicitation, Newton finished the work, which was printed under the care of Dr. Halley, and came out about Midsummer, 1687, under the title of "Philosophiæ Na-

turalis Principia Mathematica," containing, in the third book, the cometic astronomy, which had been lately discovered by him, and now made its first appearance in the world: a work which may be looked upon as the production of a celestial intelligence rather than of a man.

This work, however, in which the great author has built a new system of natural philosophy, upon the most sublime geometry, did not meet at first with all the applause it deserved, and was one day to receive. Two reasons concurred in producing this effect: Des Cartes had then got full possession of the world. His philosophy was indeed the creature of a fine imigination, gaily dress d out: he had given her likewise some of nature's fine features, and painted the rest to a seeming likeness of her. On the other hand, Newton had, with an unparalleled penetration and force of genius, pursued nature up to her most secret abode, and was intent to demonstrate her residence to others, rather than anxious to describe particularly the way by which he arrived at it himself: he finished that piece in that elegant conciseness, which had justly gained the ancients a universal esteem. In fact, the consequences flow with such rapidity from the principles, that the reader is often left to supply a long chain of reasoning to connect them, so that it required some time before the world could understand it. The best mathematicians were obliged to study it with care before they could make themselves masters of it; and those of a lower rank durst not venture upon it, till encouraged by the testimonies of the more learned. But at last, when its value came to be sufficiently known, the approbation which had been so slowly gained became universal, and nothing was to be heard from all quarters, but one general burst of admiration. "Does Mr. Newton eat, drink, or sleep like other men?" says the marquis De l'Hospital, one of the greatest mathematicians of the age, to the English who visited him. "I represent him to myself as a celestial genius entirely disengaged from matter."

In the midst of these profound mathematical researches, just before his Principia went to the press in 1686, the privileges of the university being attacked by James the Second, Newton appeared among its most strenuous defenders, and was on that occasion appointed one of their delegates to the High-commission Court. They made such a defence, that James thought proper to drop the affair. Our author was also chosen one of their members for the Convention Parliament, in 1688, in which he sat till it was dissolved.

Newton's merit was well known to Mr. Montague, then chancellor of the exchequer, and afterwards earl of Halifax, who had been bred at the same college with him; and when he undertook the great work of recoining the money, he fixed his eye upon Newton for an assistant in it; and accordingly, in 1696, he was appointed warden of the Mint, in which employment he rendered very signal serrvice to the nation. And three years after he was promoted to be master of the Mint, a place worth 12 or 1500*l.* per annum, which he held till his death. Upon this promotion he appointed Mr. Whiston his deputy in the mathematical professorship at Cambridge, giving him the *full profits* of the place, which appointment itself he also procured for him in 1703. The same year our author was chosen president of the Royal Society, in which chair he sat for 25 years, namely, till the time of his death; and he had been chosen a member of the Royal Academy of Sciences at Paris in 1699, as soon as the new regulation was made for admitting foreigners into that society.

Ever since the first discovery of the heterogeneous mixture of light, and the production of colours thence arising, he had employed a good part of his time in bringing the experiment upon which the theory is founded to a degree of exactness that might satisfy himself. The truth is, this seems to have been his favourite invention; thirty years he had spent in this arduous task, before he published it in 1704. In infinite series and fluxions, and in the constant energy of gravity, in preserving the solar system, there had been some, though distant hints, given by others before him; whereas in dissecting a ray of light into its primary constituent particles, which then admitted of no further separation, in the discovery of the different refrangibilities of these particles thus separated; and that these constituent rays had each its own peculiar colour inherent in it; that rays falling in the same angle of incidence have alternate fits of reflection and refraction; that bodies are rendered transparent by the minuteness of their pores, and become opaque by having them large; and that the most transparent body, by having a great thinness, will become less pervious to the light; in all these, which make up his new theory of light and colours, he was absolutely and entirely the first starter; and as the subject is of the most subtile and delicate nature, he thought it necessary to be himself the last finisher of it.

In fact, that which chiefly employed his researches for so many years was far from being confined to the subject of light alone. On the contrary, all that we know of natural bodies seemed to be comprehended in it; he had found out that there was a natural action, at a distance, between light and other bodies, by which both the reflections, and refractions, as well as inflections, of the former, were constantly produced. To ascertain the force and extent of this principle of action was what had all along engaged his thoughts, and what after all, by its extreme subtlety, escaped his most penetrating intellect. However, though he has not made so full a discovery of the principle, which directs the course of light, as he has in regard to the power by which the planets are kept in their courses; yet he gave the best directions possible for such as should be disposed to carry on the work, and furnished matter abundantly sufficient to animate them to the pursuit. He has, indeed, hereby opened a way of passing from optics to an entire system of physics; and, if we look upon his queries as containing the history of a great man's first thoughts, even in that view they must be always highly entertaining and curious.

This same year, and in the same book with his Optics, he published, for the first time, his Method of Fluxions. It has been already observed, that these two inventions were intended for the public so long before as 1672; but were laid by then, in order to prevent his being engaged on that account in a dispute about them. And it is not a little remarkable that, even now, this last piece proved the occasion of another dispute, which continued for many years. Ever since 1684, Leibnitz had been artfully working the world into an opinion, that he first invented this method. Newton saw his design from the beginning, and had sufficiently obviated it in the first edition of the "Principia," in 1687, (viz. in the Scholium to the

2d lemma of the 2d book:) and with the same view, when he now published that method, he took occasion to acquaint the world that he invented it in the years 1665 and 1666. In the Acta Eruditorum of Leipsic, where an account is given of this book, the author of that account ascribed the invention to Leibnitz, intimating that Newton borrowed it from him. Dr. Keill, astronomical professor at Oxford, undertook Newton's defence; and after several answers on both sides, Leibnitz complaining to the Royal Society, this body appointed a committee of their members to examine the merits of the case. These, after considering all the papers and letters relating to the point in controversy, decided in favour of Newton and Keill; as is related at large in the life of the last-mentioned gentleman; and these papers themselves were published in 1712, under the title of Commercium Epistolicum Johannis Collins, 8vo.

In 1705, the honour of knighthood was conferred upon our author by queen Anne, in consideration of his great merit. And in 1714, he was applied to by the House of Commons, for his opinion upon a new method of discovering the longitude at sea by signals, which had been laid before them by Ditton and Whiston, in order to procure their encouragement; but the petition was thrown aside upon reading Newton's paper delivered to the committee.

The following year, 1715, Leibnitz, with the view of bringing the world more easily into the belief that Newton had taken the Method of Fluxions from his Differential Method, attempted to foil his mathematical skill by the famous problem of the trajectories, which he, therefore, proposed to the English by way of challenge; but the solution of this, though the most difficult proposition he was able to devise, and what might pass for an arduous affair to any other, was hardly any more than an amusement to Newton's penetrating genius: he received the problem at 4 o'clock in the afternoon, as he was returning from the Mint; and, though he was extremely fatigued with business, he finished the solution before he went to bed.

As Leibnitz was privy-councellor of justice to the elector of Hanover, so when that prince was raised to the British throne, Newton came more under the notice of the court; and it was for the immediate satisfaction of George the First, that he was prevailed on to put the last hand to the dispute about the invention of fluxions. In this court, Caroline, princess of Wales, afterwards queen consort to George the Second, happened to have a curiosity for philosophical inquiries; no sooner, therefore, was she informed of our author's attachment to the house of Hanover, than she engaged his conversation, which soon endeared him to her. Here she found, in every difficulty, that full satisfaction which she had in vain sought for elsewhere; and she was often heard to declare, publicly, that she thought herself happy in coming into the world at a juncture of time which put it in her power to converse with him. It was at this princess's solicitations that he drew up an abstract of his Chronology; a copy of which was at her request communicated about 1718 to signior Conti, a Venetian nobleman, then in England, upon a promise to keep it secret. But, notwithstanding this promise, the abbé, who while here had also affected to show a particular friendship for Newton, though privately betraying him, as much as lay in his power, to Leibnitz, was no sooner got across the water, into France, than he dispersed copies of it, and procured an antiquary to translate it into French, as well as to write a confutation of it. This, being printed at Paris, in 1725, was delivered as a present, from the bookseller that printed it, to our author, that he might obtain, as was said, his consent to the publication; but though he expressly refused such consent, yet the whole was published the same year. Hereupon Newton found it necessary to publish a defence of himself, which was inserted in the Philos. Trans. Thus, he who had so much all his life long been studious to avoid disputes, was unavoidably all his life-time, in a manner, involved in them; nor did this last dispute even finish at his death, which happened the year following. Newton's paper was republished in 1726, at Paris, in French, with a letter of the abbé Conti, in answer to it, and the same year some dissertations were printed there by father Souciet against Newton's Chronological Index; an answer to which was inserted by Halley, in the Philos. Trans. No. 397.

Some time before this business, in his 80th year, our author was seized with an incontinence of urine, thought to proceed from the stone in the bladder, and deemed to be incurable. However, by the help of a strict regimen and other precautions, which till then he never had occasion for, he procured considerable intervals of ease during the five remaining years of his life. Yet he was not free from severe paroxysms, which even forced out large drops of sweat that ran down his face. In these circumstances he was never observed to utter the least complaint, nor express the smallest impatience; and as soon as he had a moment's ease he would smile and talk with his usual cheerfulness. He was now obliged to rely upon Mr. Conduit, who had married his niece, for the discharge of his office in the Mint. Saturday morning, March 18, 1727, he read the newspapers, and discoursed a long time with Dr. Mead, his physician, having then the perfect use of all his senses and his understanding; but that night he entirely lost them all, and not recovering them afterwards, died the Monday following, March 20, in the 85th year of his age. His corpse lay in state in the Jerusalem Chamber, and on the 28th was conveyed into Westminster-Abbey, the pall being supported by the Lord Chancellor, the dukes of Montrose and Roxburgh, and the earls of Pembroke, Sussex, and Macclesfield. He was interred near the entrance into the choir, on the left hand, where a stately monument is erected to his memory, with a most elegant inscription upon it.

Newton's character has been attempted by Mr. Fontenelle and Dr. Pemberton, the substance of which is as follows. He was of a middle stature, and somewhat inclined to be fat in the latter part of his life. His countenance was pleasing and venerable at the same time, especially when he took off his peruke, and showed his white hair, which was pretty thick. He never made use of spectacles, and lost but one tooth during his whole life. Bishop Atterbury says, that in the whole air of sir Isaac's face and make there was nothing of that penetrating sagacity which appears in his compositions: that he had something rather languid in his look and manner, which did not raise any great expectation in those who did not know him.

His temper, it is said, was so equal and mild, that no accident could disturb it. A remarkable instance of which is related as follows. Sir Isaac

had a favourite little dog, which he called Diamond. Being one day called out of his study into the next room, Diamond was left behind. When sir Isaac returned, having been absent but a few minutes, he had the mortification to find that Diamond having overset a lighted candle among some papers, the nearly finished labour of many years, was in flames, and almost consumed to ashes. This loss, as sir Isaac was then very far advanced in years was irretrievable; yet without once striking the dog, he only rebuked him with this exclamation: "Oh! Diamond! thou little knowest the mischief thou hast done!"

He was indeed of so meek and gentle a disposition, and so great a lover of peace, that he would rather have chosen to remain in obscurity, than to have the calm of life ruffled by those storms and disputes which genius and learning always draw upon those that are most eminent for them.

From his love of peace, no doubt, arose that unusual kind of horror which he felt for all disputes: a steady unbroken attention, free from those frequent recoilings inseparably incident to others, was his peculiar felicity; he knew it, and he knew the value of it. No wonder then that controversy was looked on as his bane. When some objections, hastily made to his discoveries concerning light and colours, induced him to lay aside the design he had taken of publishing his optical lectures, we find him reflecting on that dispute, into which he had been unavoidable drawn, in these terms: "I blamed my own imprudence for parting with so real a blessing as my quiet, to run after a shadow." It is true this shadow, as Fontenelle observes, did not escape him afterwards, nor did it cost him that quiet which he so much valued, but proved as much a real happiness to him as his quiet itself; yet this was a happiness of his own making; he took a resolution from these disputes not to publish any more concerning that theory, till he had put it above the reach of controversy, by the exactest experiments, and the strictest demonstrations; and accordingly it has never been called in question since. In the same temper, after he had sent the manuscript to the Royal Society, with his consent to the printing of it by them; yet upon Hook's injuriously insisting that he himself had demonstrated Kepler's problem before our author, he determined rather than be again involved in a controversy to suppress the third book; and he was very hardly prevailed upon to alter that resolution. It is true, the public was thereby a gainer; that book, which is indeed no more than a corollary of some propositions in the first, being originally drawn up in the popular way, with a design to publish it in that form; whereas he was now convinced that it would be best not to let it go abroad without a strict demonstration.

In contemplating his genius, it presently becomes a doubt which of these endowments had the greatest share, sagacity, penetration, strength, or diligence; and after all, the mark that seems most to distinguish it is, that he himself made the justest estimation of it, declaring, that if he had done the world any service, it was due to nothing but industry and patient thought; that he kept the subject of consideration constantly before him, and waited till the first dawning opened gradually, by little and little, into a full and clear light. It is said, that when he had any mathematical problems or solutions in his mind, he would never quit the subject on any account. And his servant has said, when he has been getting up in a morning he has sometimes begun to dress, and with one leg in his breeches sat down again on the bed, where he has remained for hours before he has got his clothes on: and that dinner has been often three hours ready for him before he could be brought to table. Upon this head several little anecdotes are related; among which is the following. Dr. Stukely coming in accidentally one day, when Newton's dinner was left for him upon the table, covered up, as usual, to keep it warm till he could find it convenient to come to table; the doctor, lifting the cover, found under it a chicken, which he presently ate, putting the bones in the dish, and replacing the cover. Some time after Newton came into the room, and after the usual compliments sat down to his dinner; but on taking up the cover and seeing only the bones of the fowl left, he observed with some little surprise, "I thought I had not dined, but I now find that I have."

After all, notwithstanding his anxious care to avoid every occasion of breaking his intense application to study, he was at a great distance from beeing steeped in philosophy. On the contrary, he could lay aside his thoughts, though engaged in the most intricate researches, when his other affairs required his attention: and, as soon as he had leisure, resumed the subject at the point where he had left off. This he seems to have done not so much by any extraordinary strength of memory, as by the force of his inventive faculty, to which every thing opened itself again with ease, if nothing intervened to ruffle him. The readiness of his invention made him not think of putting his memory much to the trial; but this was the offspring of a vigorous intenseness of thought, out of which he was but a common man. He spent therefore the prime of his age in those abstruse researches, when his situation in a college gave him leisure, and while study was his proper business. But as soon as he was removed to the Mint, he applied himself chiefly to the duties of that office: and so far quitted mathematics and philosophy, as not to engage in any pursuits of either kind afterwards.

Dr. Pemberton observes, that though his memory was much decayed, in the last years of his life, yet he perfectly understood his own writings, contrary to what I had formerly heard, says the doctor, in discourse from many persons. This opinion of theirs might arise perhaps from his not being always ready at speaking on these subjects, when it might be expected he should. But on this head it may be observed, that great geniuses are often liable to be absent, not only in relation to common life, but with regard to some of the parts of science that they are best informed of; inventors seem to treasure up in their minds what they have found out, after another manner than those do the same things who have not this inventive faculty. The former, when they have occasion to produce their knowledge, are in some measure obliged immediately to investigate part of what they want; and for this they are not equally fit at all times; from whence it has often happened, that such as retain things chiefly by means of a very strong memory, have appeared off-hand more expert than the discoverers themselves.

It was evidently owing to the same inventive faculty that Newton, as this writer found, had read fewer of the modern mathematicians than one could have expected; his own prodigious inven-

tion readily supplying him with what he might have occasion for in the pursuit of any subject he undertook. However he often censured the handling of geometrical subjects by algebraic calculations; and his book of Algebra he called by the name of Universal Arithmetic, in opposition to the injudicious title of Geometry, which Des Cartes had given to the treatise in which he shews how the geometrician may assist his invention by such kind of computations. He frequently praised Slusius, Barrow, and Huygens,* for not being influenced by the false taste which then began to prevail. He used to commend the laudable attempt of Hugo d'Omerique to restore the ancient analysis; and very much esteemed Apollonius's book De Sectione Rationis, for giving us a clearer notion of that analysis than we had before. Dr. Barrow may be esteemed as having shewn a compass of invention, equal, if not superior, to any of the moderns, our author only excepted; but Newton particularly recommended Huygens's style and manner; he thought him the most elegant of any mathematical writer of modern times, and the truest imitator of the ancients.

Of their taste and mode of demonstration our author always professed himself a great admirer; and even censured himself for not following them yet more closely than he did; and spoke with regret of his mistake at the beginning of his mathematical studies, in applying himself to the works of Des Cartes, and other algebraic writers, before he had considered the Elements of Euclid with that attention which so excellent a writer deserves.

But if this were a fault, it is certain it was a fault to which we owe both his great inventions in speculative mathematics, and the doctrine of fluxions and infinite series. And perhaps this might be one reason why his particular reverence for the ancients is omitted by Fontenelle, who however certainly makes some amends by that just eulogium which he makes of our author's modesty, which amiable quality he represents as standing foremost in the character of this great man's mind and manners. It was in reality greater than can be easily imagined, or will be readily believed; yet it always continued so without any alteration, though the whole world, says Fontenelle, conspired against it; let us add, though he was thereby robbed of his invention of fluxions. Nicholas Mercator publishing his Logarithmotechnia in 1668, where he gave the quadrature of the hyperbola by an infinite series, which was the first appearance in the learned world of a series of this sort drawn from the particular nature of the curve, and that in a manner very new and abstracted. Dr. Barrow, at that time at Cambridge, where Mr. Newton, then about twenty-six years of age, resided, recollected that he had met with the same thing in the writings of that young gentleman, and there not confined to the hyperbola only, but extending, by general forms, to all sorts of curves, even such as are mechanical; to their quadratures, their rectifications, and centres of gravity; to the solids formed by their rotations, and to the superficies of those solids; so that, when their determinations were possible, the series stopped at a certain point, or at least their sums were given by stated rules; and if the absolute determinations were impossible, they could yet be infinitely approximated; which is the happiest and most refined method, says Fontenelle, of supplying the defects of human knowledge, that man's imagination could possibly invent. To be master of so fruitful and general a theory was a mine of gold to a geometrician; but it was a greater glory to have been the discoverer of so surprising and ingenious a system. So that Newton, finding by Mercator's book, that he was in the way to it, and that others might follow in his track, should naturally have been forward to open his treasures, and secure the property which consisted in making the discovery; but he contented himself with his treasure, which he had found, without regarding the glory. What an idea does it give us of his unparalleled modesty, when we find him declaring, that he thought Mercator had entirely discovered his secret, or that others would, before he should become of a proper age for writing! His manuscript upon Infinite Series was communicated to none but Mr. John Collins, and lord Brounker, then president of the Royal Society, who had also done something in this way himself; and even that had not been complied with but for Dr. Barrow, who would not suffer him to indulge his modesty so much as he desired.

It is further observed, concerning this part of his character, that he never talked either of himself or others, nor ever behaved in such a manner as to give the most malicious censurers the least occasion even to suspect him of vanity. He was candid and affable, and always put himself upon a level with his company. He never thought either his merit or his reputation sufficient to excuse him from any of the common offices of social life. No singularities, either natural or affected, distinguished him from other men. Though he was firmly attached to the church of England, he was averse from the persecution of the nonconformists. He judged of men by their conduct, and the true schismatics, in his opinion, were the vicious and the wicked. Not that he confined his principles to natural religion, for he was doubtless thoroughly persuaded of the truth of revelation; and amidst the great variety of books which he had constantly before him, that which he studied with the greatest application was the bible, at least in the latter years of his life; and he understood the nature and force of moral certainty as well as he did that of a strict demonstration.

Sir Isaac did not neglect the opportunities of doing good, when the revenues of his patrimony and a profitable employment, improved by a prudent economy, put it in his power. We have two remarkable instances of his bounty and generosity; one to Mr. Maclaurin, extra professor of mathematics at Edinburgh, to encourage whose appointment he offered 20*l.* a year to that office; and the other to his niece Barton, upon whom he settled an annuity of 100*l.* per annum. When decency upon any occasion required expence and shew, he was magnificent without grudging it, and with a very good grace; at all other times, that pomp which seems great to low minds only was utterly retrenched, and the expence reserved for better uses.

Sir Isaac added to his other great qualities not only a belief in revelation, but a decided aversion to the too common habit of speaking lightly of the scriptures. One anecdote of this great man may be useful, and therefore merits a place here. Dr. Halley was an unbeliever, and was once speaking rather freely on the subject of revelation, in company with sir Isaac, who pointedly said to him— "Dr. Halley, I am always glad to hear you when you speak about astronomy, or other parts of ma-

thematics, because they are subjects which you have studied, and well understand; but you should not talk of christianity, for you have not studied it. I have, and know you know nothing of the matter."

Newton never married; and it has been said, that "perhaps he never had leisure to think of it; that, being immersed in profound studies during the prime of his age, and afterwards engaged in an employment of great importance, and even quite taken up with the company which his merit drew to him, he was not sensible of any vacancy in life, nor the want of a companion at home." These however do not appear to be any sufficient reasons for his never marrying, if he had had an inclination so to do. It is much more likely that he had a constitutional indifference to the state.

He left at his death, it seems, 32,000*l.*, but he made no will: which, Fontenelle tells us, was because he thought a legacy was no gift. As to his works, besides what were published in his lifetime, there were found after his death, among his papers, several discourses upon the subjects of antiquity, history, divinity, chemistry, and mathematics; several of which were published at different times, as appears from the following catalogue of all his works, where they are ranked in the order of time in which those upon the same subject were published.

1. Several Papers relating to his Telescope, and his Theory of Light and Colours, printed in the Philosophical Transactions, numbers 80, 81, 82, 83, 84, 85, 88, 96, 97, 110, 121, 123, 128; or vols. 6, 7, 8, 9, 10, 11.

2. Optics, or a Treatise of the Reflections, Refractions, and Inflections, and the Colours of Light, 1704, 4to. A Latin Translation, by Dr. Clarke, 1706, 4to.; and a French Translation, by P. Coste, Amst. 1729, 2 vols. 12mo. Besides several English editions in 8vo.

3. Optical Lectures, 1728, 8vo.; also in several Letters to Mr Oldenburg, Secretary to the Royal Society, inserted in the General Dictionary, under our author's article.

4. Lectiones Opticæ, 1729, 4to.

5. Naturalis Philosophiæ Principia Mathematica, 1687, 4to. A second edition in 1713, with a Preface by Roger Cotes. The third edition in 1726, under the direction of Dr. Pemberton. An English Translation by Motte, 1729, 2 vols. 8vo. printed in several editions of his works, in different nations, particularly an edition, with a large Commentary by the two learned Jesuits, Le Seur and Jacquier, in 4 vols. 4to. in 1739, 1740, and 1742.

6. A System of the World, translated from the Latin original, 1727, 8vo. This, as has been already observed, was at first intended to make the third book of his Principia. An English Translation by Motte, 1729, 8vo.

7. Several Letters to Mr. Flamsteed, Dr. Halley, and Mr. Oldenburg.

8. A Paper concerning the Longitude, drawn up by order of the House of Commons.

9. Abregé de Chronologie, &c. 1726, under the direction of the Abbé Conti, together with some Observations upon it.

10. Remarks upon the Observations made upon a Chronological Index of Sir I. Newton, &c. Philosophical Transactions, vol. 33. See also the same, vols. 34 and 35, by Dr. Halley.

11. The Chronology of Ancient Kingdoms amended, &c. 1728, 4to.

12. Arithmetica Universalis, &c. under the inspection of Mr. Whiston, Cantab. 1707, 8vo. Printed without the author's consent, and even against his will; an offence which, it seems, was scarcely forgiven. There are also English editions of the same, particularly one by Wilder, with a Commentary, in 1769, 2 vols. 8vo.; and a Latin edition, with a Commentary, by Castillion, 2 vols. 4to. Amst. &c.

13. Analysis per Quantitatum Series, Fluxiones, et Differentias, cum Enumeratione Linearum Tertii Ordinis, 1711, 4to. under the inspection of W. Jones, Esq. F.R.S. The last tract had been published before, together with another on the quadrature of curves, by the method of fluxions, under the title of Tractatus duo de Speciebus et Magnitudine Figurarum Curvilinearum, subjoined to the first edition of his Optics, in 1704, and other Letters in the Appendix to Dr. Gregory's Catoptrics, &c. 1735, 8vo. Under this head may be ranked Newtoni Genesis Curvarum per Umbras, Leyden, 1740.

14. Several Letters relating to his dispute with Leibnitz, upon the right to his Invention of Fluxions; printed in the Commercium Epistolicum D. Johannis Collins et Aliorum, de Analysi Promota, jussu Societatis Regiæ editum, 1712, 8vo.

15. Postscript and Letter of M. Leibnitz to the Abbé Conti, with Remarks, and a Letter of his own to that Abbé, 1717, 8vo. To which was added Raphson's History of Fluxions, as a Supplement.

16. The Method of Fluxions and Analysis, by Infinite Series, translated into English from the original Latin; to which is added, a Perpetual Commentary by the Translator, Mr. John Colson, 1736, 4to.

17. Several miscellaneous Pieces and Letters, as follows: 1. A Letter to Mr. Boyle upon the Subject of the Philosopher's Stone; inserted in the General Dictionary under the article Boyle. 2. A Letter to Mr. Aston, containing Directions for his Travels; ibid. under our author's article. 3. An English Translation of a Latin Dissertation upon the Sacred Cubit of the Jews; inserted among the miscellaneous Works of Mr. John Greaves, vol. 2, published by Dr. Thomas Birch, in 1737, 2 vols. 8vo. This Dissertation was found subjoined to a work of sir Isaac's, not finished, intitled Lexicon Propheticum. 4 Four Letters from Sir Isaac Newton to Dr. Bentley, containing some Arguments in Proof of a Deity, 1756, 8vo. 5. Two Letters to Mr. Clarke, &c.

18. Observations on the Prophecies of Daniel, and the Apocalypse of St. John, 1733, 4to.

19. Is. Newtoni Elementa perspectivæ Universalis, 1746, 8vo.

20. Tables for Purchasing College Leases, 1742, 12mo.

21. Corollaries, by Whiston.

22. A Collection of several Pieces of our author's under the following title: Newtoni Is. Opuscula Mathematica Philos. et Philol. Collegit I. Castilioneus, Laus, 1744, 4to. 8 tomes.

23. Two Treatises of the Quadrature of Curves, and Analysis by Equations of an Infinite Number of Terms explained, translated by John Stewart, with a large Commentary, 1745, 4to.

24. Description of an Instrument for observing the Moon's Distance from the fixed Stars at Sea. Philosophical Transactions, vol. 42.

25. Newton also published Barrow's Optical Lectures, in 1699, 4to.; and Bern. Varenii Geographia, &c. 1681, 8vo.

26. The whole Works of Newton, published by Dr. Horsley, 1779, 4to. in five volumes.

For a list of the papers left unpublished by Newton at his death, the reader may consult Dr. Hutton's Dictionary.

NEWTON (Dr. John), an eminent English mathematician and divine, was the grandson of John Newton of Axmouth in Devonshire, and son of Humphrey Newton of Oundle in Northamptonshire, where he was born in 1622. After receiving the proper foundation of a grammar education, he was sent to Oxford, where he was entered a commoner of St. Edmund's Hall in 1637. He took the degree of bachelor of arts in 1641; and the year following he was created master, in precedence to many students of quality, on account of his distinguished talents in the great branches of literature. His genius leading him strongly to astronomy and mathematics, he applied himself diligently to those sciences as well as to divinity, and made a great proficiency in them, which he found of some service to him during Cromwell's government.

After the restoration of Charles II. he reaped the fruits of his loyalty: being created doctor of divinity at Oxford, Sept. 1661, he was made one of the king's chaplains, and rector of Ross in Herefordshire, instead of Mr. John Toombes, ejected for nonconformity. He held this living till his death, which happened at Ross on Christmas day 1678, at 56 years.

Mr. Wood gave him the character of a capricious and humoursome person. However that be, his writings are a proof of his great application to study, and a sufficient monument of his genius and skill in the mathematical sciences. These are,

1. Astronomia Britannica, &c: in 4to, 1656.

2. Help to Calculation; with Tables of Declination &c: 4to, 1657.

3. Trigonometria Britannica, in two books; the one composed by our author, and the other translated from the Latin of Henry Gellibrand: folio, 1658.

4. Chiliades Centum Logarithmorum, printed with,

5. Geometrical Trigonometry: 1659.

6. Mathematical Elements, three parts: 4to, 1660.

7. A Perpetual Diary, or Almanac: 1662.

8. Description of the Use of the Carpenter's Rule: 1667.

9. Ephemerides, shewing the Interest and Rate of Money at 6 per cent. &c: 1667.

10. Chiliades Centum Logarithmorum et Tabula Partium Proportionalium: 1667.

11. The Rule of Interest, or the Case of Decimal Fractions, &c. part 2: 8vo, 1668.

12. School-pastimes for young Children, &c.: 8vo, 1669.

13. Art of Practical Guaging, &c: 1669.

14. Introduction to the Art of Rhetoric: 1671.

15. The Art of Natural Arithmetic in Whole Numbers, and Fractions Vulgar and Decimal: 8vo, 1671.

16. The English Academy: 8vo, 1677.

17. Cosmography.

18. Introduction to Astronomy.

19. Introduction to Geography: 8vo, 1678.

NEWTON (Richard), a worthy English divine, was born in Buckinghamshire, and educated at Westminster school, and elected from thence to Christ-church, Oxford, where he became eminent as a tutor, and took his degrees. In 1710 he was appointed principal of Hart-hall, but obtained scarcely any other preferment, except a canory of Christ-church just before his death, which happened in 1753. Dr. Newton, in 1740, obtained a charter for converting Hart-hall into Hertford college. He published a masterly performance, entitled, Pluralities Indefensible, and an edition of Theophrastus, with English notes.

NEWTON (Thomas), a learned writer of the 16th century, eminent for his Latin poetry. He practised physic, though he was in orders, and kept a school. He died in 1607.

NEWTON (Thomas), a learned English bishop, was born at Lichfield in Staffordshire, in 1703. He received part of his education at his native place, and partly at Westminster school; from whence he was elected to Trinity college, Cambridge, where he took his degrees, and was chosen fellow On entering into orders he became curate of St. George, Hanover-square; and 1738 morning preacher at the chapel in Spring-garden In 1744 he was preferred to the rectory of St. Mary le Bow, Cheapside; and the year following took his degree of D.D. In 1747 he was chosen lecturer of St. George, Hanover-square; and the same year married the daughter of Dr. Trebeck, the rector. In 1749 appeared his edition of Milton's Paradise Lost, with notes, variorum. In 1756 he was made chaplain to the king; and afterwards prebendary of Westminster, and precentor of York. In 1761 he obtained the bishopric of Bristol, to which was added, in 1768, the deanery of St. Paul's. He died at his deanery in 1782. Dr. Newton will principally be known as the author of some valuable dissertations on the Prophecies of the Old and New Testament, in 2 vols. 8vo.

NEWTON, a borough in Lancashire, with a market on Saturday. It sends two members to parliament, and is five miles N. of Warrington, and 190 N.W. of London. Lon. 2. 45. W. Lat 53. 28 N.

NEWTON, a borough in the isle of Wight, which sends two members to parliament, but has no market. It is 14 miles S. of Southampton, and 93 S.W. of London. Lon. 1. 16 W. Lat. 50. 43 N.

NEWTON, a town of Montgomeryshire, with a market on Saturday, seated on the Severn, seven miles S.W. of Montgomery, and 169 W.N.W. of London. Lon. 3. 12 W. Lat. 52. 21 N.

NEWTONIAN PHILOSOPHY, the doctrine of the universe, and particularly of the heavenly bodies, their laws, affections, &c. as delivered by sir Isaac Newton.

The term Newtonian philosophy is applied very differently; whence divers confused notions relating thereto.—Some authors under this philosophy in-

clude all the corpuscular philosophy, considered as it now stands, corrected and reformed by the discoveries and improvements made in several parts thereof by sir Isaac Newton. In which sense it is that Gravesande calls his elements of physics, Introductio ad Philosophiam Newtonianam. And in this sense the Newtonian is the same with the new philosophy; and stands contradistinguished from the Cartesian, the Peripatetic, and the ancient corpuscular.

Others, by Newtonian philosophy, mean the method or order which sir Isaac Newton observes in philosophising; viz. the reasoning and drawing of conclusions directly from phenomena, exclusive of all previous hypotheses, the beginning from simple principles; deducing the first powers and laws of nature from a few select phenomena, and then applying those laws, &c. to account for other things. And in this sense the Newtonian philosophy is the same with the experimental philosophy, and stands opposed to the ancient corpuscular.

Others, by Newtonian philosophy, mean that wherein physical bodies are considered mathematically, and where geometry and mechanics are applied to the solution of the appearances of nature. In which sense the Newtonian is the same with the mechanical and mathematical philosophy.

Others again, by Newtonian philosophy, understand that part of physical knowledge which sir Isaac Newton has handled, improved, and demonstrated, in his Principia.

Others, lastly, by Newtonian philosophy, mean the new principles which sir Isaac Newton has brought into philosophy; the new system founded thereon; and the new solutions of phenomena thence deduced; or that which characterizes and distinguishes his philosophy from all others.—It is in this sense principally we shall here consider it.

The whole of the Newtonian philosophy, as delivered by the author, is contained in his Principia, or Mathematical Principles of Natural Philosophy. He founds his system on the following definitions.

1. The quantity of matter is the measure of the same, arising from its density and bulk conjunctly.—Thus air of a double density, in a double space, is quadruple in quantity; in a triple space, sextuple in quantity, &c.

2. The quantity of motion is the measure of the same, arising from the velocity and quantity of matter conjunctly. This is evident, because the motion of the whole is the motion of all its parts; and therefore in a body double in quantity, with equal velocity, the motion is double, &c.

3. The vis insita, or innate force of matter, is a power of resisting, by which every body, as much as in it lies, endeavours to persevere in its present state, whether it be of rest, or moving uniformly forward in a right line.

4. An impressed force is an action exerted upon a body, in order to change its state, either of rest, or of moving uniformly forward in a right line.—This force consists in the action only; and remains no longer in the body when the action is over. For a body maintains every new state it acquires by its vis inertiæ only.

It is here implied, and indeed fully expressed, that motion is not continued by the same power that produced it. Now there are two grounds on which the truth of this doctrine may be supposed to rest.

"First, On a direct proof that the impressed force does not remain in the body, either by showing the nature of the force to be transitory and incapable of more than its first action; or that it acts only on the surface, and that the body escapes from it; or that the force is somewhere else, and not remaining in the body. But none of these direct proofs are offered.

"Secondly, It may rest on an indirect proof, that there is in the nature of a body a sufficient cause for the continuance of every new state acquired; and that therefore any adventitious force to continue motion, though necessary for its production, is superfluous and inadmissible. As this is the very ground on which the supposition stands, it ought to have been indubitably certain that the innate force of the body is sufficient to perpetuate the motion it has once acquired, before the other agent, by which the motion was communicated, had been dismissed from the office. But the innate force of body has been shown not to be that which continues its motion; and therefore the proof, that the impressed force does not remain in the body, fails. Nor indeed is it in this case desirable to support the proof, because we should then be left without any reason for the continuance of motion." When we mention an impressed force, we mean such a force as is communicated either at the surface of the body or by being diffused through the mass.

5. A centripetal force is that by which bodies are drawn, impelled, or any way tend towards a point, as to a centre.—The quantity of any centripetal force may be considered as of three kinds, absolute, accelerative, and motive.

6. The absolute quantity of a centrifugal force is a measure of the same, proportional to the efficacy of the cause that propagates it from the centre, through the spaces round about.

7. The accelerative quantity of a centripetal force is a measure of the same, proportional to the velocity which it generates in a given time.

8. The motive quantity of a centripetal force is the measure of the same, proportional to the motion which it generates in a given time.—This is always known by the quantity of a force equal and contrary to it, that is just sufficient to hinder the descent of the body.

SCHOLIA.

1. Absolute, true, and mathematical time, of itself, and from its own nature, flows equably, without regard to any thing external, and, by another name, is called duration. Relative, apparent, and common time, is some sensible and external measure of duration, whether accurate or not, which is commonly used instead of true time; such as an hour, a day, a month, a year, &c.

II. Absolute space, in its own nature, without regard to any thing external, remains always similar and immoveable. Relative space is some moveable dimension or measure of the absolute spaces; and which is vulgarly taken for immoveable space. Such is the dimension of a subterraneous, an aerial, or celestial space, determined by its position to bodies, and which is vulgarly taken for immoveable space; as the distance of a subterraneous, an aerial, or celestial space, determined by its position in respect of the earth. Absolute and relative space are the same in figure and magnitude; but they do not remain always numerically the same. For if the earth, for instance, moves, a space of our air which, relatively and in respect of the earth, remains always the same, will at one time be one part of the absolute space into which the earth passes; at another time it will be another part of the same; and so absolutely understood, it will be perpetually mutable.

III. Place is a part of space which a body takes

up; and is, according to the space, either absolute or relative. Our author says it is a part of space; not the situation, nor the external surface of the body. For the places of equal solids are always equal; but their superficies, by reason of their dissimilar figures, are often unequal. Positions properly have no quantity, nor are they so much the places themselves as the properties of places. The motion of the whole is the same thing with the sum of the motions of the parts; that is, the translation of the whole out of its place is the same thing with the sum of the translations of the parts out of their places: and therefore the place of the whole is the same thing with the sum of the places of the parts; and for that reason it is eternal, and in the whole body.

IV. Absolute motion is the translation of a body from one absolute place into another; and relative motion the translation from one relative place into another. Thus, in a ship under sail, the relative place of a body is that part of the ship which the body possesses, or that part of its cavity which the body fills, and which therefore moves together with the ship: and relative rest is the continuance of the body in the same part of the ship, or of its cavity. But real absolute rest is the continuance of the body in the same part of that immoveable space in which the ship itself, its cavity, and all that it contains, is moved. Wherefore, if the earth is really at rest, the body which relatively rests in the ship will really and absolutely move with the same velocity which the ship has on the earth. But if the earth also moves, the true and absolute motion of the body will arise, partly from the true motion of the earth in immoveable space; partly from the relative motion of the ship on the earth: and if the body moves also relatively in the ship, its true motion will arise partly from the true motion of the earth in immoveable space, and partly from the relative motions as well of the ship on the earth as of the body in the ship; and from these relative motions will arise the relative motion of the body on the earth. As if that part of the earth where the ship is was truly moved towards the east, with a velocity of 10010 parts; while the ship itself with a fresh gale is carried towards the west, with a velocity expressed by 10 of these parts; but a sailor walks in the ship towards the east with one part of the said velocity: then the sailor will be moved truly and absolutely in immoveable space towards the east with a velocity of 1001 parts; and relatively on the earth towards the west, with a velocity of 9 of those parts.

Absolute time, in astronomy, is distinguished from relative, by the equation or correction of the vulgar time. For the natural days are truly unequal, though they are commonly considered as equal, and used for a measure of time: astronomers correct this equality for their more accurate deducing of the celestial motions. It may be that there is no such thing as an equable motion whereby time may be accurately measured. All motions may be accelerated or retarded; but the true or equable progress of absolute time is liable to no change. The duration or perseverance of the existence of things remains the same, whether the motions are swift or slow, or none at all; and therefore ought to be distinguished from what are only sensible measures thereof, and out of which we collect it by means of the astronomical equation. The necessity of which equation for determining the times of a phenomenon is evinced, as well from the experiments of the pendulum-clock as by eclipses of the satellites of Jupiter.

As the order of the parts of time is immutable, so also is the order of the parts of space. Suppose those parts to be moved out of their places, and they will be moved (if we may be allowed the expression) out of themselves. For times and spaces are, as it were, the places of themselves as of all other things. All things are placed in time as to order of succession; and in space as to order of situation. It is from their essence or nature that they are places; and that the primary places of things should be moveable is absurd. These are therefore the absolute places; and translations out of those places are the only absolute motions.

But because the parts of space cannot be seen, or distinguished from one another by the senses, therefore in their stead we use sensible measures of them. For, from the positions and distances of things from any body, considered as immoveable, we define all places; and then, with respect to such places, we estimate all motions, considering bodies as transferred from some of those places into others. And so, instead of absolute places and motions, we use relative ones; and that without any inconvenience in common affairs: but in philosophical disquisitions we ought to abstract from our senses, and consider things themselves distinct from what are only sensible measures of them. For it may be, that there is no body really at rest, to which the places and motions of others may be referred.

But we may distinguish rest and motion, absolute and relative, one from the other by their properties, causes, and effects. It is a property of rest, that bodies really at rest do rest in respect of each other. And therefore, as it is possible, that, in the remote regions of the fixed stars, or perhaps far beyond them, there may be some body absolutely at rest, though it be impossible to know from the position of bodies to one another in our regions, whether any of these do keep the same position to that remote body; it follows, that absolute rest cannot be determined from the position of bodies in our regions.

It is a property of motion, that the parts which retain given positions to their wholes do partake of the motion of their wholes. For all parts of revolving bodies endeavour to recede from the axis of motion; and the impetus of bodies moving forwards arises from the joint impetus of all the parts. Therefore if surrounding bodies are moved, those that are relatively at rest within them will partake of their motion. Upon which account the true and absolute motion of a body cannot be determined by the translation of it from those only which seem to rest; for the external bodies ought not only to appear at rest, but to be really at rest. For otherwise all included bodies, beside their translation from near the surrounding ones, partake likewise of their true motions; and though that translation was not made, they would not really be at rest, but only seem to be so. For the surrounding bodies stand in the like relation to the surrounded, as the exterior part of a whole does to the interior, or as the shell does to the kernel; but if the shell moves, the kernel will also move, as being part of the whole, without any removal from near the shell.

A property near akin to the preceding is, that if a place is moved, whatever is placed therein moves along with it; and therefore a body which is moved from a place in motion, partakes also of the motion of its place. Upon which account all motions from places in motion, are no other than parts of entire and absolute motions; and every entire motion is composed of the motion of the body out of its first place, and the motion of this place out of its place;

and so on, until we come to some immoveable place, as in the above-mentioned example of the sailor. Wherefore entire and absolute motions can be no otherwise determined than by immoveable places. Now, no other places are immoveable but those that from infinity to infinity do all retain the same given positions one to another; and upon this account must ever remain unmoved, and do thereby constitute what we call immoveable space.

The causes by which true and relative motions are distinguished one from the other, are the forces impressed upon bodies to generate motion. True motion is neither generated nor altered, but by some force impressed upon the body moved: but relative motion may be generated or altered without any force impressed upon the body. For it is sufficient only to impress some force on other bodies with which the former is compared, that, by their giving way, that relation may be changed, in which the relative rest or motion of the other body did consist. Again, true motion suffers always some change from any force impressed upon the moving body; but relative motion does not necessarily undergo any changes by such force. For if the same forces are likewise impressed on those bodies with which the comparison is made, that the relative position may be preserved; then that condition will be preserved, in which the relative motion consists. And therefore any relative motion may be changed when the true motion remains unaltered, and the relative may be preserved when the true motion suffers some change. Upon which account true motion does by no means consist in such relations.

The effects which distinguish absolute from relative motion are, the forces of receding from the axis of circular motion. For there are no such forces in a circular motion purely relative; but, in a true and absolute circular motion, they are greater or less according to the quantity of the motion. If a vessel hung by a long cord is so often turned about that the cord is strongly twisted, then filled with water, and let go, it will be whirled about the contrary way; and while the cord is untwisting itself, the surface of the water will at first be plain, as before the vessel began to move; but the vessel, by gradually communicating its motion to the water, will make it begin sensibly to revolve, and recede by little and little from the middle, and ascend to the sides of the vessel, forming itself into a concave figure; and the swifter the motion becomes, the higher will the water rise, till at last, performing its revolutions in the same times with the vessel, it becomes relatively at rest in it. This ascent of the water shows its endeavour to recede from the axis of its motion; and the true and absolute circular motion of the water, which is here directly contrary to the relative, discovers itself, and may be measured by this endeavour. At first, when the relative motion in the water was greatest, it produced no endeavour to recede from the axis; the water showed no tendency to the circumference, nor any ascent towards the sides of the vessel, but remained of a plain surface; and therefore its true circular motion had not yet begun. But afterwards, when the relative motion of the water had decreased, the ascent thereof towards the sides of the vessel proved its endeavour to recede from the axis; and this endeavour showed the real circular motion of the water perpetually increasing, till it had acquired its greatest quantity, when the water rested relatively in the vessels. And therefore this endeavour does not depend upon any translation of the water in respect of the ambient bodies; nor can true circular motion be defined by such translations. There is only one real circular motion of any one revolving body, corresponding to only one power of endeavouring to recede from its axis of motion, as its proper and adequate effect: but relative motions in one and the same body are innumerable, according to the various relations it bears to external bodies; and, like other relations, are altogether destitute of any real effect, otherwise than they may perhaps participate of that only true motion. And therefore, in the system which supposes that our heavens, revolving below the sphere of the fixed stars, carry the planets along with them, the several parts of those heavens and the planets, which are indeed relatively at rest in their heavens, do yet really move. For they change their position one to another, which never happens to bodies truly at rest; and being carried together with the heavens, participate of their motions, and, as parts of revolving wholes, endeavour to recede from the axis of their motion.

Wherefore relative quantities are not the quantities themselves whose names they bear, but those sensible measures of them, either accurate or inaccurate, which are commonly used instead of the measured quantities themselves. And then, if the meaning of words is to be determined by their use, by the names *time*, *space*, *place* and *motion*, their measures are properly to be understood; and the expression will be unusual and purely mathematical, if the measured quantities themselves are meant.

It is indeed a matter of great difficulty to discover, and effectually to distinguish, the true motions of particular bodies from those that are only apparent: because the parts of that immoveable space in which those motions are performed do by no means come under the observation of our senses. Yet we have some things to direct us in this intricate affair; and these arise partly from the apparent motions which are the difference of the true motions, partly from the forces which are the causes and effects of the true motions. For instance, if two globes, kept at a given distance one from the other by means of a cord that connects them, were revolved about the common centre of gravity; we might from the tension of the cord discover the endeavour of the globes to recede from the axis of motion, and from thence we might compute the quantity of their circular motions. And then, if any equal forces should be impressed at once on the alternate faces of the globes to augment or diminish their circular motions, from the increase or decrease of the tension of the cord we might infer the increment or decrement of their motions; and thence would be found on what faces those forces ought to be impressed, that the motions of the globes might be most augmented; that is, we might discover their hindermost faces, or those which follow in the circular motion. But the faces which follow being known, and consequently the opposite ones that precede, we should likewise know the determination of their motions. And thus we might find both the quantity and determination of this circular motion, even in an immense vacuum, where there was nothing external or sensible with which the globes might be compared. But now, if in that space some remote bodies were placed that kept always a given position one to another, as the fixed stars do in our regions; we could not indeed determine from the relative translation of the globes among those bodies, whether the motion did belong to the globes or to the bodies. But if we observed the

cord, and found that its tension was that very tension which the motions of the globes required, we might conclude the motion to be in the globes, and the bodies to be at rest; and then, lastly, from the translation of the globes among the bodies, we should find the determination of their motions.

Having thus explained himself, sir Isaac proposes to show how we are to collect the true motions from their causes, effects, and apparent differences; and *vice versa*, how, from the motions, either true or apparent, we may come to the knowledge of their causes and effects. In order to this, he lays down the following axioms or laws of motion.

1. Every body perseveres in its state of rest, or of uniform motion in a right line, unless it is compelled to change that state by forces impressed upon it.

2. The alteration of motion is ever proportional to the motive force impressed; and is made in the direction of the right line in which that force is impressed.

3. To every action there always is opposed an equal re-action: or the mutual action of two bodies upon each other are always equal, and directed to contrary parts.

From the preceding axioms sir Isaac draws the following corollaries.

1. A body by two forces conjoined will describe the diagonal of a parallelogram in the same time that it would describe the sides by those forces apart.

2. Hence we may explain the composition of any one direct force out of any two oblique ones, viz. by making the two oblique forces the sides of a parallelogram, and the direct one the diagonal.

3. The quantity of motion, which is collected by taking the sum of the motions directed towards the same parts, and the difference of those that are directed to contrary parts, suffers no change from the action of bodies among themselves; because the motion which one body loses is communicated to another: and if we suppose friction and the resistance of the air to be absent, the motion of a number of bodies which mutually impelled one another would be perpetual, and its quantity always equal.

4. The common centre of gravity of two or more bodies does not alter its state of motion or rest by the actions of the bodies among themselves; and therefore the common centre of gravity of all bodies acting upon each other (excluding outward actions and impediments) is either at rest, or moves uniformly in a right line.

5. The motions of bodies included in a given space are the same among themselves, whether that space is at rest, or moves uniformly forward in a right line without any circular motion. The truth of this is evidently shown by the experiment of a ship; where all motions happen after the same manner, whether the ship is at rest, or proceeds uniformly forward in a straight line.

6. If bodies, any how moved among themselves, are urged in the direction of parallel lines by equal accelerative forces, they will all continue to move among themselves, after the same manner as if they had been urged by no such forces.

The whole of the mathematical part of the Newtonian philosophy depends on the following lemmas; of which the first is the principal.

Lem. I. Quantities, and the ratios of quantities, which in any finite time converge continually to equality, and before that time approach nearer the one to the other than by any given difference, become ultimately equal. If you deny it; suppose them to be ultimately unequal, and let D be their ultimate difference. Therefore they cannot approach nearer to equality than by that given difference D; which is against the supposition.

For this and his other lemmas sir Isaac makes the following apology. "These lemmas are premised, to avoid the tediousness of deducing perplexed demonstrations *ad absurdum*, according to the method of ancient geometers. For demonstrations are more contracted by the method of indivisibles: but because the hypothesis of indivisibles seems somewhat harsh, and therefore that method is reckoned less geometrical, I chose rather to reduce the demonstrations of the following propositions to the first and last sums and ratios of nascent and evanescent quantities, that is, to the limits of those sums and ratios: and so to premise, as short as I could, the demonstrations of those limits. For hereby the same thing is performed as by the method of indivisibles; and now those principles being demonstrated, we may use them with more safety. Therefore, if hereafter I should happen to consider quantities as made up of particles, or should use little curve lines for right ones; I would not be understood to mean indivisibles, but evanescent divisible quantities; not the sums and ratios of determinate parts, but always the limits of sums and ratios; and that the force of such demonstrations always depends on the method laid down in the foregoing lemmas.

"Perhaps it may be objected, that there is no ultimate proportion of evanescent quantities, because the proportion, before the quantities have vanished, is not the ultimate, and, when they are vanished, is none. But by the same argument it may be alleged, that a body arriving at a certain place, and there stopping, has no ultimate velocity; because the velocity before the body comes to the place is not its ultimate velocity; when it is arrived, it has none. But the answer is easy: for by the ultimate velocity is meant that with which the body is moved, neither before it arrives at its place and the motion ceases, nor after; but at the very instant it arrives; that is, that velocity with which the body arrives at its last place, and with which the motion ceases. And in like manner, by the ultimate ratio of evanescent quantities is to be understood the ratio of the quantities, not before they vanish, nor afterwards, but with which they vanish. In like manner, the first ratio of nascent quantities is that with which they begin to be. And the first or last sum is that with which they begin and cease to be (or to be augmented and diminished). There is a limit which the velocity at the end of the motion may attain, but not exceed; and this is the ultimate velocity. And there is the like limit in all quantities and proportions that begin and cease to be. And, since such limits are certain and definite, to determine the same is a problem strictly geometrical. But whatever is geometrical we may be allowed to make use of in determining and demonstrating any other thing that is likewise geometrical.

"It may be also objected, that if the ultimate ratios of evanescent quantities are given, their ultimate magnitudes will be also given; and so all quantities will consist of indivisibles, which is

contrary to what Euclid has demonstrated concerning incommensurables, in the 10th book of his Elements. But this objection is founded on a false supposition. For those ultimate ratios with which quantities vanish are not truly the ratios of ultimate quantities, but limits towards which the ratios of quantities decreasing continually approach."

LEM. II. If in any figure A *a c* E (Pl. 129, fig. 1.) terminated by the right line A*a*, AE, and the curve *a c* E, there be inscribed any number of parallelograms A*b*, B*c*, C*d*, &c. comprehended under equal bases, AB, BC, CD, &c. and the sides B*b*, C*c*, D*d*, &c. parallel to one side A*a* of the figure; and the parallelograms *a* K *b l*, *b* L *c m*, *c* M *d n*, &c. are completed. Then if the breadth of these parallelograms be supposed to be diminished, and their number augmented *in infinitum*; the ultimate ratios which the inscribed figure A K *b* L *c* M *d* D, the circumscribed figure A *a l b m c n d o* E, and curvilinear figure A *a b c d* E, will have to one another, are ratios of equality.—For the difference of the inscribed and circumscribed figures is the sum of the parallelograms K *l*, L *m*, M *n*, D *o*; that is, (from the equality of all their bases), the rectangle under one of their bases K *b*, and the sum of their altitudes A *a*, that is, the rectangle A B *l a*. But this rectangle, because its breadth A B is supposed diminished *in infinitum*, becomes less than any given space. And therefore by lem. 1. the figures inscribed and circumscribed become ultimately equal the one to the other; and much more will the intermediate curvilinear figure be ultimately equal to either.

LEM. III. The same ultimate ratios are also ratios of equality, when the breadths AB, BC, CD, &c. of the parallelograms are unequal, and are all diminished *in infinitum*.—The demonstration of this differs but little from that of the former.

In his succeeding lemmas sir Isaac goes on to prove, in a manner similar to the above, that the ultimate ratios of the sine, chord, and tangent of arcs infinitely diminished, are ratios of equality, and therefore that in all our reasonings about these we may safely use the one for the other:—that the ultimate form of evanescent triangles made by the arc, chord, and tangent, is that of similitude, and their ultimate ratio is that of equality; and hence, in reasonings about ultimate ratios, we may safely use the triangles for each other, whether made with the sine, the arc, or the tangent.—He then shows some properties of the ordinates of curvilinear figures; and proves that the spaces which a body describes by any finite force urging it, whether that force is determined and immutable, or is continually augmented or continually diminished, are, in the very beginning of the motion, one to the other in the duplicate ratio of the powers. And, lastly, having added some demonstrations, concerning the evanescence of angles of contact, he proceeds to lay down the mathematical part of his system, and which depends on the following theorems.

THEOR. I. The areas which revolving bodies describe by radii drawn to an immoveable centre of force, lie in the same immoveable planes, and are proportional to the times in which they are described.—For, suppose the time to be divided into equal parts, and in the first part of that time, let the body by its innate force describe the right line AB (fig. 2.); in the second part of that time, the same would, by law. 1. if not hindered, proceed directly to *c* along the line B*c* = AB; so that by the radii AS, BS, *c* S, drawn to the centre, the equal areas ASB, BS *c*, would be described. But when the body is arrived at B, suppose the centripetal force acts at once with a great impulse, and, turning aside the body from the right line B*c*, compels it afterwards to continue its motion along the right line BC. Draw *c* C parallel to BS, meeting BC in C; and at the end of the second part of the time, the body, by cor. 1. of the laws, will be found in C, in the same plane with the triangle ASB. Join SC; and because SB and *c* C are parallel, the triangle SBC will be equal to the triangle SB*c*, and therefore also to the triangle SAB. By the like argument, if the centripetal force acts successively in C, D, E, &c. and makes the body in each single particle of time to describe the right lines CD, DE, EF, &c. they will all lie in the same plane; and the triangle SCD will be equal to the triangle SBC, and SDE to SCD, and SEF to SDE. And therefore, in equal times, equal areas are described in one immoveable plane; and, by composition, any sums SADS, SAFS, of those areas are, one to the other, as the times in which they are described. Now, let the number of those triangles be augmented, and their size diminished *in infinitum*; and then, by the preceding lemmas, their ultimate perimeter ADF will be a curve line: and therefore the centripetal force by which the body is perpetually drawn back from the tangent of this curve will act continually; and any described areas SADS, SAFS, which are always proportional to the times of description, will, in this case also, be proportional to those times. Q. E. D.

COR. 1. The velocity of a body attracted towards an immoveable centre, in spaces void of resistance, is reciprocally as the perpendicular let fall from that centre on the right line which touches the orbit. For the velocities in these places A, B, C, D, E, are as the bases AB, BC, DE, EF, of equal triangles; and these bases are reciprocally as the perpendiculars let fall upon them.

COR. 2. If the chords AB, BC, of two arcs successively described in equal times by the same body, in spaces void of resistance, are completed into a parallelogram ABCV, and the diagonal BV of this parallelogram, in the position which it ultimately acquires when those arcs are diminished *in infinitum*, is produced both ways, it will pass through the centre of force.

COR. 3. If the chords AB, BC, and DE, EF, of arcs described in equal times, in spaces void of resistance, are completed into the parallelograms ABCV, DEFZ, the forces in B and E are one to the other in the ultimate ratio of the diagonals BV, EZ, when those arcs are diminished *in infinitum*. For the motions BC and EF of the body (by cor. 1. of the laws), are compounded of the motions B*c*, BV and E*f*, EZ; but BV and EZ, which are equal to C*c* and = F*f*, in the demonstration of this proposition, were generated by the impulses of the centripetal force in B and E, and are therefore proportional to those impulses.

COR. 4. The forces by which bodies, in spaces void of resistance, are drawn back from rectilinear motions, and turned into curvilinear orbits, are one to another as the versed sines of arcs described in equal times; which versed sines tend to the centre of force, and bisect the chords when these arcs are diminished to infinity. For such versed sines are the halves of the diagonals mentioned in cor. 3.

COR. 5. And therefore those forces are to the force of gravity, as the said versed sines to the

versed sines perpendicular to the horizon of those parabolic arcs which projectiles describe in the same time.

COR. 6. And the same things do all hold good (by cor. 5. of the laws) when the planes in which the bodies are moved, together with the centres of force, which are placed in those planes, are not at rest, but move uniformly forward in right lines.

THEOR. II. Every body that moves in any curve line described in a plane, and, by a radius drawn to a point either immoveable or moving forward with an uniform rectilinear motion, describes about that point areas proportional to the times, is urged by a centripetal force directed to that point.

CASE I. For every body that moves in a curve line is (by law I.) turned aside from its rectilinear course by the action of some force that impels it; and that force by which the body is turned off from its rectilinear course, and made to describe in equal times the least equal triangles SAB, SBC, SCD, &c. about the immoveable point S, (by Prop. 40. E. 1. and law 2.) acts in the place B according to the direction of a line parallel to C; that is, in the direction of the line BS; and in the place C according to the direction of a line parallel to *d* D, that is, in the direction of the line CS, &c.; and therefore acts always in the direction of lines tending to the immoveable point S. Q. E. D.

CASE II. And (by cor. 5. of the laws) it is indifferent whether the superficies in which a body describes a curvilinear figure be quiescent, or moves together with the body, the figure described, and its point S, uniformly forward in right lines.

COR. 1. In non-resisting spaces or mediums, if the areas are not proportional to the times, the forces are not directed to the point in which the radii meet; but deviate therefrom *in consequentia*, or towards the parts to which the motion is directed, if the description of the areas is accelerated; but *in antecedentia* if retarded.

COR. 2. And even in resisting mediums, if the description of the areas is accelerated, the directions of the forces deviate from the point in which the radii meet, towards the parts to which the motion tends.

SCHOLIUM.

A body may be urged by a centripetal force compounded of several forces. In which case the meaning of the proposition is, that the force which results out of all tends to the point S. But if any force acts perpetually in the direction of lines perpendicular to the described surface, this force will make the body to deviate from the plane of its motion, but will neither augment nor diminish the quantity of the described surface; and is therefore not to be neglected in the composition of forces.

THEOR. III. Every body that, by a radius drawn to the centre of another body, howsoever moved, describes areas about that centre proportional to the times, is urged by a force compounded of the centripetal forces tending to that other body, and of all the accelerative force by which that other body is impelled.—The demonstration of this is a natural consequence of the theorem immediately preceding.

Hence, if the one body L, by a radius drawn to the other body T, describes areas proportional to the times, and from the whole force by which the first body L is urged, (whether that force is simple, or, according to cor. 2. of the laws, compounded of several forces), we subduct that whole accelerative force by which the other body is urged; the whole remaining force by which the first body is urged will tend to the other body T, as its centre.

And *vice versa*, if the remaining force tends nearly to the other body T, those areas will be nearly proportional to the times.

If the body L, by a radius drawn to the other body T, describes areas, which, compared with the times, are very unequal, and that other body T be either at rest, or moves uniformly forward in a right line, the action of the centripetal force tending to that other body T is either none at all, or it is mixed and combined with very powerful actions of other forces: and the whole force compounded of them all, if they are many, is directed to another (immoveable or moveable) centre. The same thing obtains when the other body is actuated by any other motion whatever; provided that centripetal force is taken which remains after subducting that whole force acting upon that other body T.

SCHOLIUM.

Because the equable description of areas indicates that a centre is respected by that force with which the body is most affected, and by which it is drawn back from its rectilinear motion, and retained in its orbit, we may always be allowed to use the equable description of areas as an indication of a centre about which all circular motion is performed in free spaces.

THEOR. IV. The centripetal forces of bodies which by equable motions describe different circles, tend to the centres of the same circles; and are one to the other as the squares of the arcs described in equal times applied to the radii of circles.—For these forces tend to the centres of the circles, (by theor. 2. and cor. 2. theor. 1.) and are to one another as the versed sines of the least arcs described in equal times, (by cor. 4. theor 1.) that is, as the squares of the same arcs applied to the diameters of the circles, by one of the lemmas; and therefore, since those arcs are as arcs described in any equal times, and the diameters are as the radii, the forces will be as the squares of any arcs described in the same time, applied to the radii of the circles. Q. E. D.

COR. 1. Therefore, since those arcs are as the velocities of the bodies, the centripetal forces are in a ratio compounded of the duplicate ratio of the velocities directly, and of the simple ratio of the radii inversely.

COR. 2. And since the periodic times are in a ratio compounded of the ratio of the radii directly, and the ratio of the velocities inversely; the centripetal forces are in a ratio compounded of the ratio of the radii directly, and the duplicate ratio of the periodic times inversely.

COR. 3. Whence, if the periodic times are equal, and the velocities therefore as the radii, the centripetal forces will be also as the radii; and the contrary.

COR. 4. If the periodic times and the velocities are both in the subduplicate ratio of the radii, the centripetal forces will be equal among themselves; and the contrary.

COR. 5. If the periodic times are as the radii, and therefore the velocities equal, the centripetal forces will be reciprocally as the radii; and the contrary.

COR. 6. If the periodic times are in the sesquiplicate ratio of the radii, and therefore the velo-

cities reciprocally in the subduplicate ratio of the radii, the centripetal forces will be in the duplicate ratio of the radii inversely; and the contrary.

Cor. 7. And universally, if the periodic time is as any power R^n of the radius R, and therefore the velocity reciprocally as the power R^{n-1} of the radius, the centripetal force will be reciprocally as the power R^{2n-1} of the radius; and the contrary.

Cor. 8. The same things all hold concerning the times, the velocities, and forces, by which bodies describe the similar parts of any similar figures, that have their centres in a similar position within those figures, as appears by applying the demonstrations of the preceding cases to those. And the application is easy, by only substituting the equable description of areas in the place of equable motion, and using the distances of the bodies from the centres instead of the radii.

Cor. 9. From the same demonstration it likewise follows, that the arc which a body uniformly revolving in a circle by means of a given centripetal force describes in any time, is a mean proportional between the diameter of the circle, and the space which the same body, falling by the same given force, would descend through in the same given time.

By means of the preceding proposition, and its corollaries (says sir Isaac), we may discover the proportion of a centripetal force to any other known force, such as that of gravity. For if a body by means of its gravity revolves in a circle concentric to the earth, this gravity is the centripetal force of that body. But from the descent of heavy bodies, the time of one entire revolution, as well as the arc described in any given time, is given (by cor. 9. of this theorem). And by such proposition Mr. Huygens, in his excellent book De Horologio Oscillatorio, has compared the force of gravity with the centrifugal forces of revolving bodies.

The preceding proposition may also be demonstrated in the following manner. In any circle suppose a polygon to be inscribed of any number of sides. And if a body, moved with a given velocity along the sides of the polygon, is reflected from the circle at the several angular points; the force with which, at every reflection it strikes the circle, will be as its velocity; and therefore the sum of the forces, in a given time, will be as that velocity and the number of reflections conjunctly, that is, (if the species of the polygon be given), as the length described in that given time, and increased or diminished in the ratio of the same length to the radius of the circle; that is, as the square of that length applied to the radius; and therefore, if the polygon, by having its sides diminished *in infinitum*, coincides with the circle, as the square of the arc described in a given time applied to the radius. This is the centrifugal force, with which the body impels the circle; and to which the contrary force, wherewith the circle continually repels the body towards the centre, is equal.

On these principles hangs the whole of sir Isaac Newton's mathematical philosophy. He now shows how to find the centre to which the forces impelling any body are directed, having the velocity of the body given: and finds the centrifugal force to be always as the versed sine of the nascent arc directly, and as the square of the time inversely, or directly as the square of the velocity, and inversely as the chord of the nascent arc. From these premises he deduces the method of finding the centripetal force directed to any given point when the body revolves in a circle; and this whether the central point is near or at an immense distance; so that all the lines drawn from it may be taken for parallels. The same thing he shows with regard to bodies revolving in spirals, ellipses, hyperbolas, or parabolas.—Having the figures of the orbits given, he shows also how to find the velocities and moving powers; and, in short, solves all the most difficult problems relating to the celestial bodies with an astonishing degree of mathematical skill. These problems and demonstrations are all contained in the first book of the Principia: but to give an account of them here would far exceed our limits; neither would many of them be intelligible, excepting to first-rate mathematicians.

In the second book, sir Isaac treats of the properties of fluids, and their powers of resistance; and here he lays down such principles as entirely overthrow the doctrine of Des Cartes's vortices, which was the fashionable system in his time. In the third book he begins particularly to treat of the natural phenomena, and apply them to the mathematical principles formerly demonstrated; and, as a necessary preliminary to this part, he lays down the following rules for reasoning in natural philosophy.

1. We are to admit no more causes of natural things than such as are both true and sufficient to explain their natural appearances.

2. Therefore to the same natural effects we must always assign, as far as possible, the same causes.

3. The qualities of bodies which admit neither intension nor remission of degrees, and which are found to belong to all bodies within the reach of our experiments, are to be esteemed the universal qualities of all bodies whatsoever.

4. In experimental philosophy, we are to look upon propositions collected by general induction from phenomena as accurately or very nearly true, notwithstanding any contrary hypotheses that may be imagined, till such time as other phenomena occur, by which they may either be made more accurate, or liable to exceptions.

The phenomena first considered are, 1. That the satellites of Jupiter, by radii drawn to the centre of their primary, describe areas proportional to the times of their description; and that their periodic times, the fixed stars being at rest, are in the sesquiplicate ratio of their distances from its centre. 2. The same thing is likewise observed of the phenomena of Saturn. 3. The five primary planets, Mercury, Venus, Mars, Jupiter, and Saturn, with their several orbits, encompass the sun. 4. The fixed stars being supposed at rest, the periodic times of the five primary planets, and of the earth, about the sun, are in the sesquiplicate proportion to their mean distances from the sun. 5. The primary planets, by radii drawn to the earth, describe areas no ways proportionable to the times: but the areas which they describe by radii drawn to the sun are proportional to the times of description. 6. The moon, by a radius drawn to the centre of the earth, describes an area proportional to the time of description. All these phenomena are undeniable from astronomical observations, and are explained at large under the article Astronomy. The mathematical demonstrations are next applied by sir Isaac Newton in the following propositions.

Prop. I. The forces by which the satellites of Jupiter are continually drawn off from rectilinear motions, and retained in their proper orbit, tends

to the centre of that planet; and are reciprocally as the squares of the distances of those satellites from that centre. The former part of this proposition appears from theor. 2. or 3. and the latter from cor. 6. of theor 5.; and the same thing we are to understand of the satellites of Saturn.

PROP. II. The forces by which the primary planets are continually drawn off from rectilinear motions, and retained in their proper orbits, tend to the sun, and are reciprocally as the squares of the distances from the sun's centre. The former part of this proposition is manifest from phenomenon 5. just mentioned, and from theor. 2.; the latter from phenomenon 4. and cor. 6. of theor. 4. But this part of the proposition is with great accuracy deducible from the quiescence of the aphelion points. For a very small aberration from the reciprocal duplicate proportion would produce a motion of the apsides, sensible in every single revolution, and in many of them enormously great.

PROP. III. The force by which the moon is retained in its orbit tends towards the earth; and is reciprocally as the square of the distance of its place from the centre of the earth. The former part of this proposition is evident from phenom. 6. and theor. 2.; the latter from phenom. 6. and theor. 2. or 3. It is also evident from the very slow motion of the moon's apogee; which, in every single revolution, amounting but to 3° 3′ *in consequentia*, may be neglected: and this more fully appears from the next proposition.

PROP. IV. The moon gravitates towards the earth, and by the force of gravity is continually drawn off from a rectilinear motion, and retained in its orbit.—The mean distance of the moon from the earth in the syzigies in semidiameters of the latter, is about 60$\frac{1}{2}$. Let us assume the mean distance of 60 semidiameters in the syzigies; and suppose one revolution of the moon in respect of the fixed stars to be completed in 27^d. 7^h. 43′, as astronomers have determined; and the circumference of the earth to amount to 123,249,600 Paris feet. Now, if we imagine the moon, deprived of all motion, to be let go, so as to descend towards the earth with the impulse of all that force by which it is retained in its orbit, it will, in the space of one minute of time, describe in its fall 15$\frac{1}{4}$ Paris feet. For the versed sine of that arc which the moon, in the space of one minute of time, describes by its mean motion at the distance of 60 semidiameters of the earth, is nearly 15$\frac{1}{12}$ Paris feet; or more accurately, 15 feet 1 inch and one line $\frac{4}{9}$. Wherefore since that force, in approaching to the earth, increases in the reciprocal duplicate proportion of the distance; and, upon that account, at the surface of the earth is 60 × 60 times greater than at the moon; a body in our regions, falling with that force, ought, in the space of one minue of time, to describe 60 × 60 × 15$\frac{1}{12}$ Paris feet; and in the space of one second of time to describe 15$\frac{1}{11}$ of those feet; or, more accurately, 15 feet 1 inch, 1 line $\frac{4}{9}$. And with this very force we actually find that bodies here on earth do really descend.—For a pendulum oscillating seconds in the latitude of Paris, will be three Paris feet and 8$\frac{1}{2}$ lines in length, as Mr. Huygens has observed. And the space which a heavy body describes by falling one second of time, is to half the length of the pendulum in the duplicate ratio of the circumference of the circle to its diameter; and is therefore 15 Paris feet, 1 inch, 1 line $\frac{4}{9}$. And therefore the [illegible] by which the moon is retained in its orbit becomes, at the very surface of the earth, equal to the force of gravity which we observe in heavy bodies there. And therefore (by rule 1. and 2.) the force by which the moon is retained in its orbit is that very same force which we commonly call gravity. For were gravity another force different from that, then bodies descending to the earth with the joint impulse of both forces would fall with a double velocity, and, in the space of one second of time, would describe 30$\frac{1}{6}$ Paris feet; altogether against experience.

The demonstration of this proposition may be more diffusely explained after the following manner. Suppose several moons to revolve about the earth, as in the system of Jupiter or Saturn, the periodic times of those moons would (by the argument of induction) observe the same law which Kepler found to obtain among the planets; and therefore their centripetal forces would be reciprocally as the squares of the distances from the centre of the earth, by Prop. I. Now, if the lowest of these were very small, and were so near the earth as almost to touch the tops of the highest mountains, the centripetal force thereof, retaining it in its orbit, would be very nearly equal to the weights of any terrestrial bodies that should be found upon the tops of these mountains; as may be known from the foregoing calculation. Therefore, if the same little moon should be deserted by its centrifugal force that carries it through its orbit, it would descend to the earth; and that with the same velocity as heavy bodies do actually descend with upon the tops of those very mountains, because of the equality of forces that oblige them both to descend. And if the force by which that lowest moon would descend were different from that of gravity, and if that moon were to gravitate towards the earth, as we find terrestrial bodies do on the tops of mountains, it would then descend with twice the velocity, as being impelled by both these forces conspiring together. Therefore, since both these forces, that is, the gravity of heavy bodies, and the centripetal forces of the moons, respect the centre of the earth, and are similar and equal between themselves, they will (by rule 1. and 2.) have the same cause. And therefore the force which retains the moon in its orbit, is that very force which we commonly call gravity; because otherwise, this little moon at the top of a mountain must either be without gravity, or fall twice as swiftly as heavy bodies use to do.

Having thus demonstrated that the moon is retained in its orbit by its gravitation towards the earth, it is easy to apply the same demonstration to the motions of the other secondary planets, and of the primary planets round the sun, and thus to show that gravitation prevails throughout the whole creation; after which, sir Isaac proceeds to show from the same principles, that the heavenly bodies gravitate towards each other, and contain different quantities of matter, or have different densities in proportion to their bulks.

PROP. V. All bodies gravitate towards every planet; and the weights of bodies towards the same planet, at equal distances from its centre, are proportional to the quantities of matter they contain. It has been confirmed by many experiments, that all sorts of heavy bodies (allowance being made for the inequality of retardation by some small resistance of the air) descend to the earth from equal heights in equal times; and that equality of times we may distinguish to a great accuracy by the help of pendulums. Sir Isaac

Newton tried the thing in gold, silver, lead, glass, sand, common salt, wood, water, and wheat. He provided two wooden boxes, round and equal, filled the one with wood, and suspended an equal weight of gold in the centre of oscillation of the other. The boxes hanging by equal threads of 11 feet, made a couple of pendulums, perfectly equal in weight and figure, and equally receiving the resistance of the air. And placing the one by the other, he observed them to play together forwards and backwards, for a long time, with equal vibrations. And therefore the quantity of matter in the gold was to the quantity of matter in the wood, as the action of the motive force (or *vis motrix*) upon all the gold, to the action of the same upon all the wood; that is, as the weight of the one to the weight of the other. And the like happened in the other bodies. By these experiments, in bodies of the same weight, he could manifestly have discovered a difference of matter less than the thousandth part of the whole, had any such been. But, without all doubt, the nature of gravity towards the planets, is the same as towards the earth. For, should we imagine our terrestrial bodies removed to the orb of the moon, and there, together with the moon, deprived of all motion, to be let go, so as to fall together towards the earth; it is certain, from what we have demonstrated before, that, in equal times, they would describe equal spaces with the moon, and of consequence are to the moon, in quantity of matter, as their weights to its weight. Moreover, since the satellites of Jupiter perform their revolutions in times which observe the susquiplicate proportion of their distances from Jupiter's centre, their accelerative gravities towards Jupiter will be reciprocally as the squares of their distance from Jupiter's centre; that is, equal at equal distances. And therefore, these satellites, if supposed to fall towards Jupiter from equal heights, would describe equal spaces in equal times, in like manner as heavy bodies do on our earth. And by the same argument, if the circumsolar planets were supposed to be let fall at equal distances from the sun, they would, in their descent towards the sun, describe equal spaces in equal times. But forces, which equally accelerate unequal bodies, must be as those bodies; that is to say, the weights of the planets towards the sun must be as their quantities of matter. Further, that the weights of Jupiter and of his satellites towards the sun are proportional to the several quantities of their matter, appears from the exceeding regular motions of the satellites. For if some of those bodies were more strongly attracted to the sun in proportion to their quantity of matter than others, the motions of the satellites would be disturbed by that inequality of attraction. If, at equal distances from the sun, any satellite, in proportion to the quantity of its matter, did gravitate towards the sun, with a force greater than Jupiter in proportion to his, according to any given proportion, suppose of d to e; then the distance between the centre of the sun and of the *satellite's* orbit would be always greater than the distance between the centres of the sun and of Jupiter nearly in the subduplicate of that proportion. And if the satellite gravitated towards the sun with a force less in the proportion of e to d, the distance of the centre of the satellite's orb from the sun would be less than the distance of the centre of Jupiter's from the sun in the subduplicate of the same proportion. Therefore, if at equal distances from the sun, the accelerative gravity of any satellite towards the sun were greater or less than the accelerating gravity of Jupiter towards the sun but by $\frac{1}{1000}$ part of the whole gravity; the distance of the centre of the satellite's orbit from the sun would be greater or less than the distance of Jupiter from the sun by $\frac{1}{2000}$ part of the whole distance; that is, by a fifth part of the distance of the utmost satellite from the centre of Jupiter; an eccentricity of the orbit which would be very sensible. But the orbits of the satellites are concentric to Jupiter; therefore the accelerative gravities of Jupiter, and of all its satellites, towards the sun, are equal among themselves. And by the same argument, the weight of Saturn and of his satellites towards the sun, at equal distances from the sun, are as their several quantities of matter; and the weights of the moon and of the earth towards the sun, are either none, or accurately proportional to the masses of matter which they contain.

But further, the weights of all the parts of every planet towards any other planet are one to another as the matter in the several parts. For if some parts gravitated more, others less, than in proportion to the quantity of their matter; then the whole planet, according to the sort of parts with which it most abounds, would gravitate more or less than in proportion to the quantity of matter in the whole. Nor is it of any moment whether these parts are external or internal. For if, as an instance, we should imagine the terrestrial bodies with us to be raised up to the orb of the moon, to be there compared with its body; if the weights of such bodies were to the weights of the external parts of the moon as the quantities of matter in the one and in the other respectively, but to the weights of the internal parts in a greater or less proportion; then likewise the weights of those bodies would be to the weight of the whole moon in a greater or less proportion; against what we have shewed above.

Cor. 1. Hence the weights of bodies do not depend upon their forms and textures. For if the weight could be altered with the forms, they would be greater or less according to the variety of forms in equal matter; altogether against experience.

Cor. 2. Universally, all bodies about the earth gravitate towards the earth; and the weights of all, at equal distances from the earth's centre, are as the quantities of matter which they severally contain. This is the quality of all bodies within the reach of our experiments: and therefore (by rule 3.) to be affirmed of all bodies whatsoever. If ether, or any other body, were either altogether void of gravity, or were to gravitate less in proportion to its quantity of matter; then, because (according to Aristotle, Des Cartes, and others) there is no difference betwixt that and other bodies, but in mere form of matter, by a successive change from form to form, it might be changed at last into a body of the same condition with those which gravitate most in proportion to their quantity of matter; and, on the other hand, the heaviest bodies, acquiring the first form of that body, might by degrees quite lose their gravity. And therefore the weights would depend upon the forms of bodies, and with those forms might be changed; contrary to what was proved in the preceding corollary.

Cor. 3. All spaces are not equally full. For if all spaces were equally full, then the specific gravity of the fluid which fills the region of the air, on account of the extreme density of the matter, would fall nothing short of the specific gravity

of quicksilver or gold, or any other the most dense body; and therefore, neither gold, nor any other body, could descend in air. For bodies do not descend in fluids, unless they are specifically heavier than the fluids. And if the quantity of matter in a given space can by any rarefaction be diminished, what should hinder a diminution to infinity?

Cor. 4. If all the solid particles of all bodies are of the same density, nor can be rarefied without pores, a void space or vacuum must be granted. (By bodies of the same density, our author means those whose *vires inertiæ* are in the proportion of their bulks.)

Prop. VI. That there is a power of gravity tending to all bodies, proportional to the several quantities of matter which they contain.

That all the planets mutually gravitate one towards another, we have proved before; as well as that the force of gravity towards every one of them, considered apart, is reciprocally as the square of the distance of places from the centre of the planet. And thence it follows, that the gravity tending towards all the planets is proportional to the matter which they contain.

Moreover, since all the parts of any planet A gravitate towards any other planet B, and the gravity of every part is to the gravity of the whole as the matter of the part to the matter of the whole; and (by law 3.) to every action corresponds an equal re-action: therefore the planet B will, on the other hand, gravitate towards all the parts of the planet A; and its gravity towards any one part will be to the gravity towards the whole, as the matter of the part to the matter of the whole. Q. E. D.

Cor. 1. Therefore the force of gravity towards any whole planet arises from, and is compounded of, the forces of gravity towards all its parts. Magnetic and electric attractions afford us examples of this. For all attraction towards the whole arises from the attractions towards the several parts. The thing may be easily understood in gravity, if we consider a greater planet as formed of a number of lesser planets, meeting together in one globe. For hence it would appear that the force of the whole must arise from the forces of the component parts. If it be objected, that, according to this law, all bodies with us must mutually gravitate one towards another, whereas no such gravitation any where appears; it is answered, that, since the gravitation towards these bodies is to the gravitation towards the whole earth, as these bodies are to the whole earth, the gravitation towards them must be far less than to fall under the observation of our senses. The experiments with regard to the attraction of mountains, however, have now further elucidated this point.

Cor. 2. The force of gravity towards the several equal particles of any body, is reciprocally as the square of the distance of places from the particles.

Prop. VII. In two spheres mutually gravitating each towards the other, if the matter in places on all sides round about and equidistant from the centres, is similar; the weight of either sphere towards the other will be reciprocally as the square of the distance between their centres.

For the demonstration of this, see the Principia, book i. prop. 75 and 76.

Cor. 1. Hence we may find and compare together the weights of bodies towards different planets. For the weights of bodies revolving in circles about planets are as the diameters of the circles directly, and the squares of their periodic times reciprocally; and their weights at the surfaces of the planets, or at any other distances from their centres, are (by this prop.) greater or less, in the reciprocal duplicate proportion of the distances. Thus from the periodic times of Venus, revolving about the sun, in 224d. 16¾h; of the utmost circumjovial satellite revolving about Jupiter, in 16d. $16\frac{8}{15}$h.; of the Huygenian satellite about Saturn in 15d. 22⅔h.; and of the moon about the earth in 27d. 7h. 43′: compared with the mean distance of Venus from the sun, and with the greatest heliocentric elongations of the outmost circumjovial satellite from Jupiter's centre, 8′ 16″; of the Huygenian satellite from the centre of Saturn, 3′ 4″; and of the moon from the earth, 10′ 33″; by computation our author found, that the weight of equal bodies, at equal distances from the centres of the sun, of Jupiter, of Saturn, and of the earth, towards the sun, Jupiter, Saturn, and the earth, were one to another as $\frac{1}{1067}$, $\frac{1}{3021}$, and $\frac{1}{169282}$ respectively. Then, because as the distances are increased or diminished, the weights are diminished or increased in a duplicate ratio; the weights of equal bodies towards the sun, Jupiter, Saturn, and the earth, at the distances 10000, 997, 791, and 109, from their centres, that is, at their very superficies, will be as 10000, 943, 529, and 435 respectively.

Cor. 2. Hence likewise we discover the quantity of matter in the several planets. For their quantities of matter are as the forces of gravity at equal distances from their centres, that is, in the sun, Jupiter, Saturn, and the earth, as 1, $\frac{1}{1067}$, $\frac{1}{3021}$, and $\frac{1}{169282}$ respectively. If the parallax of the sun be taken greater or less than 10″ 30‴, the quantity of matter in the earth must be augmented or diminished in the triplicate of that proportion.

Cor. 3. Hence also we find the densities of the planets. For (by prop. 72. book 1.) the weights of equal and similar bodies towards similar spheres, are, at the surfaces of those spheres, as the diameters of the spheres. And therefore the densities of dissimilar spheres are as those weights applied to the diameters of the spheres. But the true diameters of the sun, Jupiter, Saturn, and the earth, were one to another as 10000, 997, 791, and 109; and the weights towards the same, as 10000, 943, 529, and 435 respectively; and therefore their densities are as 100, 94½, 67, and 400. The density of the earth, which comes out by this computation, does not depend upon the parallax of the sun, but is determined by the parallax of the moon, and therefore is here truly defined. The sun therefore is a little denser than Jupiter, and Jupiter than Saturn, and the earth four times denser than the sun; for the sun, by its great heat, is kept in a sort of a rarefied state. The moon also is denser than the earth.

Cor. 4. The smaller the planets are, they are, *cæteris paribus*, of so much the greater density. For so the powers of gravity on their several surfaces come nearer to equality. They are likewise, *cæteris paribus*, of the greater density as they are nearer to the sun. So Jupiter is more dense than Saturn, and the earth than Jupiter. For the planets were to be placed at different distances from the sun, that, according to their degrees of density, they might enjoy a greater or less proportion of the sun's heat. Our water, if it were removed as far as the orb of Saturn, would be converted into ice, and in the orb of Mercury would quickly fly away in vapour. For the light of the sun, to which its heat is proportional, is seven times denser in the orb of Mercury than with us: and by the thermometer sir Isaac found, that a sevenfold heat of our

summer-sun will make water boil. Nor are we to doubt, that the matter of Mercury is adapted to its heat, and is therefore more dense than the matter of our earth; since, in a denser matter, the operations of nature require a stronger heat.

It is shown in the scholium of prop. 22. book 2 of the Principia, that, at the height of 200 miles above the earth, the air is more rare than it is at the superficies of the earth, in the ratio of 30 to 0,0000000000003998, or as 75000000000000 to 1 nearly. And hence the planet Jupiter, revolving in a medium of the same density with that superior air, would not lose by the resistance of the medium the 1000000th part of its motion in 1000000 years. In the space near the earth the resistance is produced only by the air, exhalations, and vapours. When these are carefully exhausted by the air-pump from under the receiver, heavy bodies fall within the receiver with perfect freedom, and without the least sensible resistance; gold itself, and the lightest down, let fall together, will descend with equal velocity; and though they fall through a space of four, six, and eight feet, they will come to the bottom at the same time; as appears from experiments that have often been made. And therefore the celestial regions being perfectly void of air and exhalations, the planets and comets, meeting no sensible resistance in those spaces, will continue their motions through them for an immense space of time.

On these, and such-like principles, depends the Newtonian Mathematical Philosophy. The author farther shews how to find the centre to which the forces impelling any body are directed, having the velocity of the body given: and finds that the centrifugal force is always as the versed sine of the nascent arc directly, and as the square of the velocity, and inversely as the chord of the nascent arc. From these premises he deduces the method of finding the centripetal force directed to any given point when the body revolves in a circle; and this whether the central point be near hand, or at immense distance; so that all the lines drawn from it may be taken for parallels. And he shews the same thing with regard to bodies revolving in spirals, eclipses, hyperbolas, or parabolas. He shews also, having the figures of the orbits given, how to find the velocities and moving powers; and indeed resolves all the most difficult problems relating to the celestial bodies with a surprising degree of mathematical skill. These problems and demonstrations are all contained in the first book of the Principia: but an account of them here would neither be generally understood, nor easily comprized in the limits of this work.

In the second book, Newton treats of the properties and motion of fluids, and their powers of resistance, with the motion of bodies through such resisting mediums, those resistances being in the ratio of any powers of the velocities; and the motions being either made in right lines or curves, or vibrating like pendulums. And here he demonstrates such principles as entirely overthrow the doctrine of Des Cartes's vortices, which was the fashionable system in his time; concluding the book with these words: "So that the hypothesis of vortices is utterly irreconcileable with astronomical phenomena, and rather serves to perplex than explain the heavenly motions. How these motions are performed in free spaces without vortices, may be understood by the first book; and I shall now more fully treat of it in the following book Of the System of the World."—In this second book he makes great use of the doctrine of fluxions, then lately invented; for which purpose he lays down the principles of that doctrine in the 2d lemma, in these words: "The moment of any genitum is equal to the moments of each of the generating sides drawn into the indices of the powers of those sides, and into their coefficients continually:" which rule he demonstrates, and then adds the following scholium concerning the invention of that doctrine: "In a letter of mine, (says he). to Mr. J. Collins, dated December 10, 1672, having described a method of tangents, which I suspected to be the same with Slusius's method, which at that time was not made public; I subjoined these words: 'This is one particular, or rather a corollary, of a general method which extends itself, without any troublesome calculation, not only to the drawing of tangents to any curve lines, whether geometrical or mechanical, or any how respecting right lines or other curves, but also to the resolving other abstruser kinds of problems about the curvature, areas, lengths, centres of gravity of curves, &c.; nor is it (as Hudden's method de Maximis et Minimis) limited to equations which are free from surd quantities. This method I have interwoven with that other of working in equations, by reducing them to infinite series.' So far that letter. And these last words relate to a treatise I composed on that subject in the year 1671." Which, at least, is therefore the date of the invention of the doctrine of fluxions.

On entering upon the 3d book of the Principia, Newton briefly recapitulates the contents of the two former books in these words: "In the preceding books I have laid down the principles of philosophy; principles not philosophical, but mathematical; such, to wit, as we may build our reasonings upon in philosophical enquiries. These principles are, the laws and conditions of certain motions, and powers or forces, which chiefly have respect to philosophy. But lest they should have appeared of themselves dry and barren, I have illustrated them here and there with some philosophical scholiums, giving an account of such things as are of a more general nature, and which philosophy seems chiefly to be founded on; such as the density and the resistance of bodies, spaces void of all matter, and the motion of light and sounds. It remains, he adds, that from the same principles I now demonstrate the frame of the system of the world. Upon this subject, I had indeed composed the 3d book in a popular method, that it might be read by many. But afterwards considering that such as had not sufficiently entered into the principles could not easily discern the strength of the consequences, nor lay aside the prejudices to which they had been many years accustomed; therefore to prevent the disputes which might be raised upon such accounts, I chose to reduce the substance of that book into the form of propositions, in the mathematical way, which should be read by those only who had first made themselves masters of the principles established in the preceding books."

The preceding and other propositions and corollaries, are proved or illustrated by a great variety of experiments in all the great points of physical astronomy; such as, That the motions of the planets in the heavens may subsist an exceeding long time: that the centre of the system of the world is immoveable: that the common centre of gravity of the earth, the sun, and all the planets, is

immoveable:—that the sun is agitated by a perpetual motion, but never recedes far from the centre of gravity of all the planets: that the planets move in ellipses which have their common focus in the centre of the sun; and, by radii drawn to that centre, they describe areas proportional to the times of description: the aphelions and nodes of the orbits of the planets are fixt: to find the aphelions, eccentricities, and principal diameters of the orbits of the planets: that the diurnal motions of the planets are uniform, and that the libration of the moon arises from her diurnal motion; of the proportion between the axes of the planets and the diameters perpendicular to those axes: of the weights of bodies in the different regions of our earth: that the equinoctial points go backwards, and that the earth's axis, by a nutation in every annual revolution, twice vibrates towards the ecliptic, and as often returns to its former position: that all the motions of the moon, and all the inequalities of those motions, follow from the principles above laid down: of the unequal motions of the satellites of Jupiter and Saturn: of the flux and reflux of the sea, as arising from the actions of the sun and moon; of the forces with which the sun disturbs the motions of the moon: of the various motions of the moon, of her orbit, variation, inclinations of her orbit, and the several motions of her nodes: of the tides, with the forces of the sun and moon to produce them: of the figure of the moon's body: of the precession of the equinoxes: and of the motions and trajectory of comets. The great author then concludes with a general scholium, containing reflections on the principal parts of the great and beautiful system of the universe, and of the infinite, eternal Creator and Governor of it. But for these we beg to refer to the Principia themselves.

Thus we see how sir Isaac Newton found that the laws of Kepler were only particular cases of a fact or law still more general. He found that the deflections of the planets from uniform rectilineal motion were all directed to the sun; and that the simultaneous deflections were inversely proportional to the squares of the distances from him.

Hence was established a physical law of vast extent: but further observation showed him, that the motion of every body of the solar system was compounded of an original motion of projection, combined with a deflection towards every other body: and that the simultaneous deflections were proportional to the quantity of matter in the body towards which they were directed, and to the reciprocal of the square of the distance from it. Thus was the law made still more general. He did not stop here. He compared the deflection of the moon in her orbit with the simultaneous deflection of a stone thrown from the hand, and describing a parabola; and he found that they followed the same law; that is, that the deflection of the moon in a second, was to that of the stone in the same time, as the square of the stone's distance from the centre of the earth, to the square of the moon's distance from it. Hence he concluded, that the deflection of a stone from a straight line was just a particular instance of the deflections which took place through the whole solar system.

The deflection of a stone is one of the indications it gives of its being *gravis* or heavy; whence he calls it gravitation. He therefore expresses the physical law which obtains through the whole solar system, by saying, that "every body gravitates to every other body; and the gravitations are proportional to the quantity of matter in that other body, and inversely proportional to the square of the distance from it."

Thus we see how the arrangement of the celestial phenomena terminated in the discovery of physical laws; and that the expression of this arrangement is the law itself.

Since the fall of a heavy body is one instance of the physical law, and since this fall is considered by all as the effect of its weight, and this weight is considered as the cause of the fall, the same cause is assigned for all the deflections observed in the solar system; and all the matter in it is found to be under the influence of this cause, or to be heavy; and thus his doctrine has been denominated the *system of universal gravitation.*

Philosophers have gone farther, and have supposed that gravity is a power, property, or quality, residing in all the bodies of the solar system. Sir Isaac Newton does not expressly say so, at least in that work where he gives an account of these discoveries. He contents himself with the immediate consequence of the first axiom in natural philosophy, viz. that every body remains in a state of rest, or of uniform rectilineal motion, unless affected by some moving force. Since the bodies of the solar system are neither in a state of rest, nor of uniform rectilineal motion, they must be considered as so affected: that is, that there operates on every one of them a moving force, directed towards all the others, and having the proportions observed in the deflection.

Other philosophers have endeavoured to shew, that this general fact, detected by sir Isaac Newton, is included in another still more general, viz. that every body moves which is impelled by another body in motion. They assert, that all the bodies of the solar system are continually impelled by a fluid which they call ether, which is moving in all places, and in all directions, or in circular vortices, and hurries along with it the planets and all heavy bodies. It would seem that the familiarity of motion produced by impulse, at least in those instances in which our own exertions are most employed, has induced philosophers to adopt such notions; perhaps too, they are influenced by an obscure and indistinct notion affixed to the term action, as applied to changes in the material world, and which has given rise to an axiom, "that a body cannot act at a distance, or where it is not;" and thus have thought themselves obliged to look out for an immediate and contiguous agent in all those phenomena.

The philosophers, however, who profess to be most scrupulous in their adherence to the rules of philosophic discussion, deny the legitimacy of this pretended investigation of causes. But the debate is foreign to our present purpose.

NEWTOWN, a town of Wales, in Montgomeryshire, with a market on Saturday, seated on the Severn, seven miles S.W. of Montgomery, and 177 W.N.W. of London.

NEWTOWN, a town of New Jersey, the seat of justice in Sussex county, 60 [illegible] N. of Trenton. Lon. 75. 2 W. Lat. [illegible] N.

NEWTOWN ARDES, a borough of Ireland, in the county of Down, with a considerable linen manufacture. It is situate on the northern point of Strangford Lough, eight miles E. of Belfast, and 16 N. of Downpatrick.

NEXI, among the Romans, persons free born, who for debt were reduced to a state of slavery.

NEXT. *a.* (nezt, Saxon.) 1. Nearest in place (*Bacon*). 2. Nearest in time (*Gay*). 3. Nearest in any gradation (*Clarendon*).

Next. *ad.* At the time or turn immediately succeeding (*Addison*).

NGAN-CHAN, a city of China, of the first rank, in the province of Koeitcheou. Its territory is very mountainous, and contains several garrisoned forts, to keep in awe the inhabitants, who are independent, and live on the mountains. It is 1000 miles S.S.W. of Pe-king. Lon. 105. 32 E. Lat. 26. 12 N.

NGAN-KING, a city of China, capital of the W. part of the province of Kiang-nan. It is defended by a fort, and seated on the Kian-ku, 575 miles S. of Pe-king Lon. 116. 45 E. Lat. 30 37 N.

NGAN-LO, a city of China, of the first rank, in the province of Hou-quang. It has a considerable trade, and stands in a vast plain on the river Han, 575 miles S.S.W. of Pe-king. Lon. 112 3 E. Lat. 31. 14 N.

NIAGARA, a fort of United America, in the state of New York, on the south side of Lake Ontario. This fort was built by the French, and was taken by the English, under sir William Johnson, in the year 1759. Lon. 79. 1 W. Lat. 43. 14 N.

Niagara, a river of United America, which rises from Lake Erie, and runs into Lake Ontario, at Fort Niagara. About the middle of the river are the celebrated falls of Niagara, which are reckoned one of the greatest natural curiosities in the world. The waters which supply the river Niagara rise near 2000 miles to the north-west, and, passing through the lakes Superior, Michigan, Huron, and Erie, receiving in their course constant accumulations, at length, with astonishing grandeur, rush down a stupendous precipice, of 150 feet perpendicular; and, in a strong rapid current, that extends to the distance of eight or nine miles below, fall near as much more: the river then loses itself in Lake Ontario.

NI'AS. *a.* (*niais*, French.) Simple, silly, and foolish (*Bailey*).

NIB. *s.* (*nebbe*, Dutch.) 1. The bill or beak of a bird. (See Neb.) 2. The point of any thing (*Derham*).

NI'BBED *a.* (from *nib.*) Having a nib.

To NI'BBLE. *v. a.* (from *nib*, the beak or mouth). 1. To bite by little at a time; to eat slowly (*Shakspeare. Cleveland*). 2. To bite as a fish does the bait (*Gay*).

To Ni'bble. *v. n.* 1. To bite at (*Shakspeare*). 2. To carp at; to find fault with (*Tillotson*).

NI'BBLER. *s.* (from *nibble.*) One that bites by little at a time.

NICÆ[illegible] widow of Alexander, who married Demetriu[illegible] A city of India, built by Alexander on the very spot where he had obtained a victory over king Porus.—A town of Bithynia, built by Antigonus, the son of Philip, king of Macedonia. It was originally called Antigonia, and afterwards Nicæa by Lysimachus, who gave it the name of his wife, who was daughter of Antipater.—A town of Liguria.

NICAISE (Claude), a French antiquary, born at Dijon. He entered into orders, and obtained a canonry, which he resigned, and went to Rome, where he resided several years. He died in 1701, aged 78. He published, 1. De Nummo Pantheo; 2. A Discourse on the Form and Figure of the Syrenes; 3. A Dissertation on the Schools of Athens and Parnassus, which were two of Raphael's pictures.

NICANDER of Colophon, a grammarian, poet, and physician, who flourished B.C. 140. Of all the writings he composed, two only are extant; one entitled, Theriaca, describing in verse the accidents resulting from wounds made by venomous animals, and their remedies; 2 Alexipharmaca, or a poem on poisons, and their antidotes.

NICANDRA, in botany, a genus of the class decandria, order monogynia. Calyx turbinated, four-parted; corol one-petalled, deeply ten-cleft; filaments inserted in a nectariferous ring; berry six grooved, three-celled, many-seeded. One species; a native of Guiana, with simple, woolly stem; leaves opposite, oblong-ovate, entire; corymb few-flowered, terminal; calyx yellow; corol white. The leaves and stalks are bitter, and are used by the natives as an emetic and cathartic.

NICARAGUA, a large river of South America, in a province of the same name, whose western extremity lies within five miles of the South Sea. It is full of dreadful cataracts, and falls at length into the North Sea.

Nicaragua, a maritime province of South America, in Mexico, bounded on the north by Honduras, on the east by the North Sea, on the south-east by Costa Rica, and on the south-west by the South Sea; being 400 miles in length from east to west, and 120 in breadth from north to south. It is one of the most fruitful and agreeable provinces in Mexico, and is well watered with lakes and rivers. The air is wholesome and temperate; and the country produces plenty of sugar, cochineal, and fine chocolate. One of the lakes is 200 miles in circumference, has an island in the middle, and, as some say, has a tide. Leon de Nicaragua is the capital town.

NICARIA, an island of the Archipelago, between Samos and Tine, about 50 miles in circumference. A chain of high mountains runs through the middle, covered with wood, and supplies the country with springs. The inhabitants are very poor, and of the Greek communion: however, they have a little wheat, and a good deal of barley, figs, honey, and wax.

NICASTRO, an episcopal town of Italy, in the kingdom of Naples, and in the Farther Calabria; 16 miles south of Cosenza. Lon. 15. 59 E. Lat. 39. 15 N.

NICAUSIS, or, according to the Arabians, Balkis, queen of Sheba, who visited Solomon upon the report which had reached her of his wisdom. Her country was probably that part of Arabia Felix which was inhabited by the Sabeans; but Josephus pretends that she reigned over Egypt and Ethiopia.

NICCOLANUM. A new metal discovered by Richter, and thus denominated by him,

because it always accompanies nickel in its ores.

Richter had been occupied in purifying nickel for a considerable time, and had collected about half a pound of the oxyd of that metal, from which he expected at least a quarter of a pound of metallic nickel. But upon exposing it to a sufficiently strong heat, not more than one ounce of nickel could be obtained: the rest was reduced to a kind of scoria. This matter was triturated to powder, mixed with charcoal, and exposed for eighteen hours to the strongest heat of a porcelain furnace. By this means, under a blackish-brown scoria, there was found a metallic button, which weighed 2½ ounces. This button exhibited peculiar properties; and was the first specimen of the metal denominated niccolanum.

Its colour is steel grey, with a shade of red. It exhibits a coarse, granular structure when broken: is slightly malleable while cold, but not when red hot: and is attracted by the magnet, but not so powerfully as nickel. Specific gravity after fusion 8·55: when hammered, 8.60.

It dissolves in nitric acid more readily than nickel. The solution has a blackish green colour; and when concentrated gelatinizes. When the acid is driven off a blackish powder remains, which is the peroxyd of niccolanum. This oxyd is insoluble in nitric acid, unless some sugar or alcohol be added to the mixture. It dissolves in muriatic acid, while oxymuriatic gass exhales. The solution is dark-green: when evaporated to dryness it assumes a red colour, but becomes again green as it attracts moisture from that atmosphere. The sulphur of niccolanum exhibits the same phænomena.

Carbonate of potash throws down niccolanum from its solutions of a pale blue colour; pure pot-ash of a dark-green colour. Ammonia renders the solutions of niccolanum red, but occasions no precipitate.

There are two oxyds of niccolanum. The first is greenish blue, the second black. Neither of them is reducible per se. The last does not combine with acids.

NICCOLUM. Nickel. In mineralogy, a genus of the class metals. Reddish-white, hard, malleable, attracted by the magnet, and itself convertible into the magnet; specific gravity 9,000: fusing with great difficulty, but assuming a green colour when heated, and acquiting a purple tinge if the heat be continued; melting with borax into a glass of a hyacinth colour; soluble in all acids, giving the solution a green colour, and in ammonia, to which it gives a blueish-green. Three species.

1. N. ochraceum. Nickel ochre: oxyd of nickel. Green, without lustre, of a common form. Found in Saxony, Bohemia, Silesia, on the surface of other ores of nickel, in the form of powder or indurated: colour apple-green, rarely grass-green, dark-green, or blueish-green; has an earthy appearance, and is very friable; gives an earthy smell when breathed on, and slightly stains the fingers; does not melt before the blow-pipe, but gives a reddish or yellowish tinge to borax. It appears to originate from the decomposition of native nickel ore.

2. N. metallinum. Arsenicated nickel; arseniat of nickel; oxyd of nickel. With metallic lustre, entirely soluble in nitric acid, emitting arsenical vapours before the blow-pipe. Found in the mines of Bohemia, Saxony, and Harz, in irregular masses, and often mixed with sulphat of barytes; colour pale-grey, with often a mixture of pale-green; fracture compact, partly earthy, partly splintery, with a white streak; gives an earthy smell when breathed on, and adheres slightly to the tongue; contains some cobalt and alumina, and often sulphat of barytes, besides the arsenical acid.

3. N. sulphuratum. Sulphurated nickel: native nickel: copper or kupfer-nickel. With metallic lustre, not quite soluble in nitric acid, emitting arsenical vapours and sulphurous flame, and vapours before the blow-pipe. Found at Triego, in Cornwall, in Siberia, Sweden, Saxony, Hungary, Bohemia; massive or disseminated, never crystallized, in a matrix of calcareous or of heavy spar, and often coated with nickel ochre; colour coppery-red, with variations of reddish-white or grey; texture compact, conchoidal, foliated, or striated, with often curved, lamellar, concentric concretions; before the blowpipe it exhales an arsenical smell, and melts into a bead, which gradually darkens by exposure to the air: specific gravity 6,608 to 6,648: frequently contains bismuth, cobalt, and iron, but always a portion of pyrites.

Pure nickel appears capable of two states of oxydation. By long exposure to an intense heat, with access of air, it is converted to a dark brown oxyd, which is still magnetical: on the other hand, the colour of all its salts is green, and the precipitate thrown down on decomposing them with alkali is green also: whence it may be concluded, that the perfect oxyd of nickel is green, unless the colour, as in the case of the green oxyds of copper, be owing to a combination with water. The green oxyd of nickel, by moderate ignition, becomes ash-grey, with a slight tinge of blue or green; and in this state, according to Klaproth, is composed of 66 of metal, and 34 of oxygen. By further ignition it becomes of a blackish-grey, and contains, according to Richter, 78 of metal, and 22 of oxygen. Both the oxyds of nickel by strong ignition in close vessels, even without the contact of any inflammable body, are reduced to the metallic state.

Sulphuric acid, especially when heated, dissolves either nickel or its oxyd; and by evaporation to dryness, in order to drive off the superfluous acid, leaves behind a saline mass soluble in water, and from which, by evaporation, may be obtained rhomboidal octohedrons, truncated at their bases of sulphat of nickel. The colour of this salt is a bright emerald green, which, by moderate ignition, to drive off the water of crystallization, becomes of a greenish white.

Nitric acid, by the assistance of heat, acts vigorously on metallic nickel, or its oxyds, and

forms with it a grass-green solution, from which are obtained by evaporation rhomboidal crystals. These, on exposure to the air, at first deliquate; but by long exposure to a warm atmosphere lose the greater part of their acid, and crumble to a greenish-white powder.

Muriatic acid scarcely acts on reguline nickel, but dissolves its oxyd without difficulty: the evaporated solution deposits irregular crystals, at first deliquescent, and afterwards efflorescent, like those of nitrated nickel.

Solutions of all these salts are decomposed by the alkaline hydrosulphurets, with which they form black precipitates; but sulphuretted hydrogen has no apparent effect upon them. Prussiat of potash throws down a bright sea-green precipitate: of which, according to Bergman, 250 parts contain 100 of metalic nickel. These proportions, however, differ materially from those given by Klaproth; according to whom 100 grains of reguline nickel, after solution in sulphuric acid, give a precipitate by prussiat of potash, which, after being ignited so as to become entirely attractible by the magnet, weighs 300 grains.

Tincture of galls produce no precipitate or even turbidness. The mild alkalies occasion a light apple-green precipitate of carbonated nickel, in the proportion, according to Bergman, when carbonated soda is employed, of 135 parts for every 100 of regulus: but according to Richter, when carbonated potash is employed, of 292 parts for every 100. The pure caustic alkalies also afford a precipitate amounting, according to Bergman, to 128 parts for every 100 of regulus.

Pure ammonia, when added to saturation, to any of the salts of nickel, throws down a green precipitate, which is again dissolved by an excess of the same alkali. The solution is now of a beautiful sky-blue colour, and probably contains the acid, the ammonia, and oxyd of nickel, combined into a triple salt. The ammoniaco-nitrat of nickel exhibits, according to Thenard, the following properties. It deposits green crystals by evaporation: it is decomposed by sulphuretted hydrogen, and the alkaline sulphurets: neither alkalies nor acids effect any change in it at the common temperature, but by ebullition with caustic potash the ammonia is driven off, nitre is formed, and oxyd of nickel precipitates. It may also be decomposed by first saturating the ammonia with an acid, and then adding carbonated soda.

Not only the salts of nickel but the oxyds also, and even the regulus, are soluble in ammonia: the colour of the fluid thus produced is a dark purple-blue, like the ammoniuret of copper. It is decomposable with precipitation of the metallic oxyd by either of the caustic fixed alkalies, as has been already observed in the preceding section.

None of the metals are capable of decomposing salts of nickel. Even zinc, although assisted by an excess of muriatic acid in the solution, and a boiling temperature, has no effect on the salt when the nickel is pure. A mud-coloured precipitate, indeed, is not unfrequently deposited from the solution of common nickel; but this precipitate is for the most part arsenic and iron, with which nickel, purified in the common way, always abounds. Hence it is, that in proportion to the action of the zinc on this compound salt, the green colour of the solution becomes more and more bright; and when all the arsenic capable of precipitation by this method has fallen down, no farther digestion with zinc or any other metal will produce the least effect.

There are no experiments on the combination of pure nickel with sulphur or phosphorus; but as the common regulus unites without difficulty with these combustibles, it is probable that the pure metal will do so likewise.

The alloys of nickel with the other metals have been but little examined. When combined with gold in the proportion of three or four grains of the former to an ounce of the latter, neither the colour nor malleability of the mass differs materially from that of pure gold; but if the proportion of nickel amounts to 20 grains of alloy in the ounce, the result is a mixture of a brass colour, a coarse grain, and very brittle. With silver it may be combined, according Bergman, in nearly equal proportions, without impairing in any remarkable degree either the colour or ductility of the silver. With copper it forms an alloy of less ductility than pure copper, and the magnetic quality of the nickel is diminished, though not destroyed. With tin it forms a white brittle compound. By mixture with arsenic it forms a brittle and easily fusible mass, entirely incapable of being acted upon by the magnet. If the proportion of arsenic in the compound is considerable, it will emit fumes of this metal by exposure to the blow-pipe; and if it be broken to pieces and roasted at a low red heat, it will be covered with a green arborescence of arsenicated oxyd of nickel: by a repetition of alternate roastings and reductions with a carbonaceous flux, the arsenic may be so far separated, as that the alloy will give out no more vapours nor produce any arborescence; after which, by repeated scorification with nitre, the remaining arsenic may be almost entirely got rid of.

Nickel and iron seem to unite together in all proportions. The colour of the alloy approaches more to that of silver as the nickel prevails in it, and its ductility and power of magnetism appear to be equal to that of pure iron. It is remarkable that all the specimens of meteoric stone that have been analyzed are natural alloys of iron and nickel, of which this latter constitutes from 1.5 to 17. per cent. These masses differ from pure iron in being scarcely at all oxydable by exposure to the weather: it is highly probable, therefore, that nickel may become a metal of vast importance, if its power of protecting iron from rust be fully established.

Oxyd of nickel is soluble by fusion in various vitrescent mixtures, to which it gives different tinges of colour, according to the nature of the saline ingredient made use of as a flux.

A mixture of pure siliceous earth 60 grains.
———— carbonated potash 60
———— oxyd of nickel 3

affords by fusion a hard, clear violet-blue glass,

A mixture of siliceous earth	-	60 grains,
———— calcined borax	-	60
———— oxyd of nickel	-	3

yield a glass of a clear brown, with a tinge of blue, or a hyacinthine colour. A similar effect is produced if either carbonat of soda or microcosmic salt be substituted for borax. With the last of these fluxes the glass while hot is of a deep garnet-red colour.

A mixture of siliceous earth	-	60
———— vitrified phosphoric acid prepared from bones		60
———— oxyd of nickel	-	3

produce a honey-yellow glass, but not quite transparent. This defect, however, is in all probability to be attributed to the phosphat of lime, which phosphoric acid so prepared almost always contains. For farther observations on this metal, see Aikin's Dict. of Chemistry and Mineralogy.

NICE. *a.* (nere, Saxon, soft.) 1. Accurate in judgment to minute exactness; superfluously exact. It is often used to express a culpable delicacy (*Sidney*). 2. Scrupulously and minutely cautious (*Shakspeare*). 3. Fastidious; squeamish (*Milton*). 4. Easily injured; delicate (*Roscommon*). 5. Formed with minute exactness (*Addison*). 6. Requiring scrupulous exactness (*Newton*). 7. Refined (*Milton*).

Nice, a county of Italy, bounded on the W. by the river Var and the Maritime Alps, which divide it from France; on the N. by Piedmont; on the E. by the territories of Genoa; and on the S. by the Mediterranean. It was anciently an appendage of Provence, in France, but has, for many years, belonged to the king of Sardinia. In 1792 it was conquered by the French, and has been since decreed by them an integral part of France, and made a department, by the name of the Maritime Alps. It is 60 miles long and 30 broad, and contains about 125,000 inhabitants.

Nice, an ancient and considerable city of Italy, capital of a county of the same name, with a citadel and a bishop's see. It is of a triangular form, and confined in its situation, having a high rock on the E. the river Paglion on the W. and the Mediterranean on the S.; from which last it is separated by a beautiful and extensive terrace, used as a public walk. The harbour is on the E. side of the rock, and called Limpia, from a small river that falls into it. The exports are silk, sweet oil, wine, cordials, rice, oranges, lemons, and all sorts of dried fruits. It has been several times taken by the French, and last of all in 1792. It is four miles E. of the mouth of the Var, and 83 S. by W. of Turin. Lon. 7. 23 E. Lat. 43. 42 N.

Nice, an ancient town of Asia, in Natolia, now called Isnic, with a Greek archbishop's see. It is famous for the general council assembled here in 325, which endeavoured to suppress the doctrines of Arius. It was formerly a large, populous, and well-built place, and even now is not inconsiderable. See Isnic.

[illegible]ELY. *ad.* (from *nice.*) 1. Accurately; minutely; scrupulously (*Shakspeare*). 2. Delicately (*Atterbury*).

NI'CENESS. *s.* (from *nice*). 1. Accuracy; minute exactness (*Dryden*). 2. Superfluous delicacy or exactness (*Sidney*).

NICENE-CREED, was composed and established, as a proper summary of the christian faith, by the council at Nice in 325, against the Arians. It is also called the Constantinopolitan creed, because it was confirmed, with some few alterations, by the council of Constantinople in 381. See Creed.

NICERON (John Francis), a mathematician, born at Paris 1613. He took the habit of the minims, and devoted much of his time to optics. He died at Aix in Provence, 1646; but though only 33 years of age, he was author of some valuable works, especially l'Interpretation des Chiffres, &c.; Thaumaturgus Opticus, &c.

Niceron (John Peter), author of Memoirs of Men illustrious in the Republic of Letters, was born at Paris, 1685. He early took the habit of a Barnabite jesuit, and studied at Montarges, Loches, and Poitiers. He became a popular preacher, and to fondness for laborious studies he brought an extensive knowledge of ancient and modern languages. He died 1738. Besides his Memoirs, a valuable work, of which the first volume appeared in 1727, and the 39th in 1738, to which three more have been added, he wrote a translation of Hancock's book on the Virtues of Common Water, 2 vols. 12mo.; the Conversion of England to Christianity, &c.

NICETAS (Arhominates), a Greek historian, fled from Constantinople when taken by the French, 1204, and settled at Nice in Bithynia, where he died 1206. He wrote an history or annals from 1118 to the death of Baldwin, 1205.

NICETERIA, a festival at Athens, in memory of the victory which Minerva obtained over Neptune, in their dispute about giving a name to the capital of the country.

NI'CETY. *s.* (from *nice.*) 1. Minute accuracy of thought (*Prior*). 2. Accurate performance, or observance (*Addison*). 3. Fastidious delicacy; squeamishness (*Spenser*). 4. Minute observation; punctilious discrimination; subtilty (*Locke*). 5. Delicate management; cautious treatment (*Swift*). 6. Effeminate softness. 7. Niceties, in the plural, is generally applied to dainties or delicacies in eating.

NICHABURG, a city of Persia, the largest and richest in Korasan, famous for a mine of turquois-stones in its neighbourhood. It is 37 miles S. of Meschid. Lon. 57. 48 E. Lat. 36. 30 N.

NICHE, in architecture, a hollow sunk into a wall, for the commodious and agreeable placing of a statue. The word comes from the Italian *nechia*, a sea-shell; in regard the statue is here inclosed in a shell, or perhaps on account of the shell wherewith the tops of some of them are adorned.

NICHOLAS ISLAND, a small island on the N. coast of the island of Cuba. Lon. 79. 40 W. Lat. 33. 50 N.

NICHOLAS (St.), a town of France, in the department of Meurthe, with a handsome church, dedicated to St. Nicholas, to which pilgrims formerly resorted. It is seated on the Meurthe, five miles S.E. of Nanci, and 265 E. of Paris.

NICHOLAS (St.), a seaport of Russia, in the government of Archangel, seated at the mouth of the Dwina, on the White Sea, six miles S. of Archangel.

NICHOLAS (St.), or MOLE ST. NICHOLAS, a town, harbour, and cape of the West Indies, at the N.W. extremity of St. Domingo, commanding the strait called the Windward Passage. The harbour is nine furlongs broad at the entrance; and ships of any burden may ride at anchor in the basin, even during a hurricane. It was taken by the English, aided by the French royalists, in 1793; and was evacuated in 1798. Lon. 73. 20 W. Lat. 19. 15 N.

NICHOLAS (Abraham), an English penman, born in Bread-street, London. He is author of Examples of Penmanship; Complete Writing-master, in 31 folio plates, &c. He kept a school at Clapham, and died about 1744, aged 52.

NICHOLLS (Frank), a physician, born in London, 1699, and educated at Westminster, and Christ-church, Oxford. His anatomical lectures at Oxford were popular, but his remarks on subjects of anatomy tended to inculcate infidelity in his pupils. He was physician to George II. and published an account of his death in the Philosophical Transactions. He wrote besides, a tract de Animâ Medicâ; de Motu Cordis et Sanguinis in Homine; and died in 1779, aged 80.

NICHOLS (William), a divine, born at Donington, Bucks, 1664. He was of Magdalen-hall, Oxford, afterwards of Wadham, and in 1684 was elected fellow of Merton. He was rector of Selsey, near Chichester. His life was devoted to study, and to acts of piety. He died about 1712. His works were numerous and valuable; the best known are, Conference with a Theist, 2 vols. 8vo.; Defensio Ecclesiæ Anglicanæ, 1707, 12mo. afterwards published in 8vo. and in English; a Commentary on the Liturgy of the English Church, in 8vo. and folio, a book much esteemed by many persons.

NICIAS, an Athenian general, celebrated for his valour and for his misfortunes. He established his military character by taking the island of Cythera from the power of Lacedæmon. When Athens determined to make war against Sicily, Nicias was appointed, with Alcibiades and Lamachus, to conduct the expedition, which he reprobated as impolitic, and as the future cause of calamities to the Athenian power. In Sicily he behaved with great firmness, but he often blamed the quick and inconsiderate measures of his colleagues. The success of the Athenians remained long doubtful. Alcibiades was recalled by his enemies to take his trial, and Nicias was left at the head of affairs. Syracuse would have surrendered to him had not the sudden appearance of Gylippus, the Corinthian ally of the Sicilians, cheered up the courage of the besieged at the critical moment. Gylippus proposed terms to the Athenians, which were refused; some battles were fought, in which the Sicilians obtained the advantage; and Nicias at last desponding, demanded of the Athenians a reinforcement or a successor. Demosthenes, upon this, was sent with a powerful fleet; but the advice of Nicias was despised, and the admiral, by his eagerness, ruined his fleet and the interest of Athens. Nicias at last found himself surrounded on every side by the enemy, without hope of escaping. He gave himself up to the conquerors with all his army, with the assurance of safety; but he was no sooner in the hands of the enemy than he was shamefully put to death with Demosthenes, 413 B. C. His troops were sent to quarries, where the plague and hard labour soon destroyed them. The Athenians lamented in Nicias a great and valiant, but unfortunate general.

NICIAS, a celebrated painter of Athens, flourished about 322 years before the christian æra; and was universally extolled for the great variety and noble choice of his subjects, the force and relievo of his figures, his skill in the distribution of the lights and shadows, and his dexterity in representing all sorts of four-footed animals, beyond any master of his time. His most celebrated piece was that of Tartarus or Hell, as it is described by Homer, for which king Ptolemy the son of Lagus offered him sixty talents, or 11,250l. which he refused, and generously presented it to his own country. He was much esteemed likewise by all his cotemporaries for his excellent talent in sculpture.

NICK. *s.* (*nicke*, Teutonic, the twinkling of an eye). 1. Exact point of time at which there is necessity or convenience (*Suckling*). 2. A notch cut in any thing. 3. A score; a reckoning (*Shakspeare*). 4. A winning throw (*niche*, Fr.) (*Prior*).

To NICK. *v. a.* (from the noun.) 1. To hit; to touch luckily; to perform by some slight artifice (*Hudibras*). 2. To cut in nicks or notches (*Shakspeare*). 3. To suit, as tallies cut in nicks (*Camden*). 4. To defeat or cozen (*Shakspeare*).

NICKEL, a metal of considerable consequence, both in a mineralogical and chemical point of view. Its general properties in the former will be found under its technical name NICCOLUM, which see. We shall here only subjoin a few additional hints concerning its history and chemical powers.

There was found in different parts of Germany, about the year 1690, a heavy mineral of a reddish-brown colour, not unlike copper. When exposed to the air it gradually looses its lustre, becomes at first brownish, and is at last covered with green spots. It was at first taken for an ore of copper; but as none of that metal can be extracted from it, the German miners give it the name of kupfernickel, or

false copper. Hierne, who may be considered as the father of the Swedish chemists, is the first person who mentions this mineral. He gives a description of it in a book published by him in 1694, on the art of detecting metals. It was generally considered by mineralogists as an ore of copper, till it was examined by the celebrated Cronstedt. He concluded from his experiments, which were published in the Stockholm Transactions for 1751 and 1754, that it contained a new metal, to which he gave the name of nickel.

This opinion was embraced by all the Swedes, and indeed by the greater number of chemical philosophers. Some, however, particularly Sage and Monnet, affirmed that it contained no new metal, but merely a compound of various known metals, which could be separated from each other by the usual processes. These assertions induced Bergman to undertake a very laborious course of experiments, in order, if possible, to obtain nickel in a state of purity; for Cronstedt had not been able to separate a quantity of arsenic, cobalt, and iron, which adhered to it with much obstinacy. These experiments, which were published in 1775, fully confirmed the conclusions of Cronstedt.

Nickel, when perfectly pure, is of a fine white colour, resembling silver; and, like that metal, it leaves a white trace when rubbed upon the polished surface of a hard stone. It is rather softer than iron. Its specific gravity is 9. Its malleability, when cold, is rather greater than that of iron, but it cannot be heated without being oxidated, and in consequence rendered brittle. It is attracted by the magnet as strongly as iron. Like that metal, it may be converted into a magnet; and in that state points to the north when freely suspended, precisely as a common magnetic needle. It requires for fusion a temperature at least equal to 150° Wedgewood. It has not hitherto been crystallized.

When heated in an open vessel it combines with oxygen, and assumes a green colour; and if the heat is continued acquires a tinge of purple. The oxyd of nickel, according to Klaproth, is composed of seventy-seven parts of nickel, and twenty-three of oxygen.

Nickel has not been combined with carbon nor hydrogen, but it combines readily with sulphur and phosphorus. Cronstedt found that sulphuret of nickel may be easily formed by fusion. The sulphuret which he obtained was yellow and hard, with small sparkling facets; but the nickel which he employed was impure.

Phosphuret of nickel may be formed either by fusing nickel along with phosphoric glass, or by dropping phosphorus into it while red-hot. It is of a white colour, and when broke it exhibits the appearance of very slender prisms collected together. When heated, the phosphorus burns, and the metal is oxidated. It is composed of eighty-three parts of nickel and seventeen of phosphorus. The nickel, however, on which this experiment was made, was not pure.

Nickel is not acted upon by azote, nor does it combine with muriatic acid.

The alloys of this metal are but very imperfectly known. With gold it forms a white and brittle alloy; with copper, a white, hard, brittle alloy, easily oxidized when exposed to the air; with tin it forms a white, hard, brittle mass, which swells up when heated; with lead it does not combine without difficulty; with silver and mercury it refuses to unite; its combination with platinum has not been tried.

It is in combination with iron, however, that this metal has a chance of being very shortly found of its utmost importance. From a variety of experiments that have been lately made it is found not only to combine very readily, but, in certain proportions, to preserve it from rusting, while it does not interfere with its malleability. The best proportions for this purpose are perhaps those which these metals exhibit in the form of meteoric stones, which is about one part and a half of nickel to seventeen parts of iron. The subject requires still farther attention, and is fully entitled to it.

The affinities of nickel and its oxyd are, according to Bergman, as follows:

Nickel.	*Oxyd of Nickel.*
Iron,	Oxalic acid,
Cobalt,	Muriatic,
Arsenic,	Sulphuric,
Copper,	Tartaric,
Gold,	Nitric,
Tin,	Phosphoric,
Antimony,	Fluoric,
Platinum,	Saclactic,
Bismuth,	Succinic,
Lead,	Citric,
Silver,	Lactic,
Zinc,	Acetic,
Sulphur,	Arsenic,
Phosphorus.	Boracic,
	Prussic,
	Carbonic.

NICKNA'ME. *s.* (*nom de nique*, French.) A name given in scoff or contempt (*B. Jonson*).

To NICKNA'ME. *v. a.* To call by an opprobrious appellation (*Denham*).

NICKUR-TREE. See GUILANDINA.

NICOBAR ISLANDS, several islands at the entrance of the gulph of Bengal. They are almost entirely uncultivated; but the cocoa-nut, the mellori or lerum (a kind of bread fruit), and other tropical fruits, grow spontaneously to the greatest perfection. Dogs and hogs are the principal animals. The inhabitants are few, and their indolence extreme. They are tall, and well-proportioned, with black eyes, black lank hair, and dark copper-coloured skins. They live in little huts, having no towns, and go quite naked, except a cloth about the waist. They have neither temples nor idols, nor does there seem to be any great superiority among them. These islands extend northward, from the N. point of Sumatra. The largest, which gives name to the rest, is 40 miles long and 15 broad. Its S. extremity is in Lon. 94. 23 E. Lat. 8. 0 N.

NICOLAI (John), of Monza, near Verdun,

was a dominican, and for 20 years professor of theology at Paris, where he died 1673, aged 79. Besides an edition of Thomas Aquinas, in 19 vols. folio, he published some dissertations on ecclesiastical discipline, &c.

NICOLAITANS, in church history, christian heretics who assumed this name from Nicholas of Antioch; who, being a Gentile by birth, first embraced Judaism and then Christianity; when his zeal and devotion recommended him to the church of Jerusalem, by whom he was chosen one of the first deacons. Many of the primitive writers believe that Nicholas was rather the occasion than the author of the infamous practices of those who assumed his name, who were expressly condemned by the Spirit of God himself, Rev. ii. 6. And indeed their opinions and actions were highly extravagant and criminal. They allowed a community of wives, and made no distinction between ordinary meats and those offered to idols. According to Eusebius, they subsisted but a short time; but Tertullian says, that they only changed their name, and that their heresies passed into the sect of the Cainites.

NICOLAS (St.), one of the largest and the most pleasant of the Cape de Verd Islands, between St. Lucia and St. Jago. It is 75 miles in length; and is the residence of the bishop of the isles. Lon. 14. 10 W. Lat. 16. 32 N.

NICOLE (Peter), one of the finest writers in Europe, was born at Chartres in 1625, of a conspicuous family. He adhered to the Jansenists; and joined in the composition of several works with Mr. Arnauld, whose faithful companion he was during the ten or twelve years of his retirement. He gave a Latin translation of Pascal's Provinciales, and added a commentary to them. One of his finest works is his Essais de Morale. He wrote very subtilely against the protestants. His treatise on the unity of the church is esteemed a masterly piece. He died at Paris in 1695, a few days after the publication of his treatise concerning the quietists. He was well skilled in polite literature. To him is ascribed a collection of Latin epigrams, and of Greek, Spanish, and Italian sentences, which has borne several impressions, and has a learned preface to it.

NICOLE (Francis), a very celebrated French mathematician, was born at Paris, December the 23d, 1683. His early attachment to the mathematics induced M. Montmort to take the charge of his education: and he opened out to him the way to the higher geometry. He first became publicly remarkable by detecting the fallacy of a pretended quadrature of the circle. This quadrature a M. Mathulon so assuredly thought he had discovered, that he deposited in the hands of a public notary at Lyons the sum of 3000 livres, to be paid to any person who, in the judgment of the Academy of Sciences, should demonstrate the falsity of his solution. M. Nicole, piqued at this challenge, undertook the task, and exposing the paralogism, the academy's judgment was, that Nicole had plainly proved that the rectilineal figure which Mathulon had given as equal to the circle, was not only unequal to it, but that it was even greater than the polygon of 32 sides circumscribed about the circle. The prize of 3000 livres Nicole presented to the public hospital of Lyons.

The academy named Nicole eleve-mechanician, March 12, 1707; adjunct in 1716; associate in 1718; and pensioner in 1724; which he continued till his death, which happened the 18th of January 1758, at 75 years of age.

His works were all inserted in the different volumes of the Memoirs of the Academy of Sciences; and a complete list of them is given in Dr. Hutton's Mathematical Dictionary.

NICOLO (St.), the most considerable of the isles of Tremeti, in the gulf of Venice. It has a harbour, defended by a fortress, in which is an abbey and a church. Lon. 15. 37 E. Lat. 42. 10 N.

NICOMEDES First, a king of Bithynia, about 278 years before the christian æra. It was by his exertions that this part of Asia became a monarchy. He behaved with great cruelty to his brothers, and built a town which he called by his own name, Nicomedia. (*Justin. Paus.* &c.)—The second was ironically surnamed Philopater, because he drove his father Prusias from the kingdom of Bithynia, and caused him to be assassinated, B. C. 149. He reigned 59 years.—The third, son and successor of the preceding, was dethroned by his brother Socrates, and afterwards by the ambitious Mithridates. The Romans re-established him on his throne, but he was again expelled another time from his dominions, till Sylla came into Asia, who restored him to his former power. (*Strab. Appian.*)—The fourth of that name was son and successor of Nicomedes III. He died B. C. 75, without issue, and left his kingdom, with all his possessions, to the Roman people. (*Strab.* &c.)—This name was common also to others of less celebrity.

NICOMEDIA, a town of Natolia, now called Ischmich, or Schmit. It was formerly much larger, as appears by the fine ruins; but is still a place of consequence. It carries on a trade in silk, cotton, glass, and earthen ware; and contains 30,000 inhabitants, who consist of Greeks, Armenians, and Turks. It is the see of a Greek archbishop, and is 50 miles S.W. of Constantinople. Lon. 29. 30 E. Lat. 40. 30 N.

NICOMEDUS, a geometrician, famous on account of the invention of the curve called conchoid, which is equally useful in resolving the two problems of doubling the cube and trisecting the angle. It appears that he lived soon after Eratosthenes, for he rallied that philosopher on the mechanism of his mesolabe. Geminus, who lived in the second century before Jesus Christ, has written on the conchoid, though Nicomedus was always esteemed the inventor of it. Those who place him four or five centuries after Jesus Christ must be igno-

rant of these facts, by which we are enabled to ascertain pretty nearly the time in which he lived.

NICOPOLI, a town of European Turkey, in Bulgaria, famous for the first battle fought between the Turks and the Christians in 13 6, when emperor Sigismund was defeated, and had 20,000 men killed. It is seated on the Danube, at the influx of the Osma, 60 miles S.S.W. of Buchorest, and 150 N.N.W. of Adrianople. Lon. 25. 43 E. Lat. 41. 16 N.

NICOPOLI, or GLANISH, a town of Turkish Armenia, built by Pompey in memory of a victory gained over Mithridates. It is 15 miles S. of Erzerum

NICOPOLIS, in ancient geography, a name common to eight considerable cities and towns in Asia and Europe.

NICOSIA, the capital of Cyprus, seated near the mountain Olympus. From the time of Constantine the great, till 1567, it was nine miles in circumference; but the Venetians, finding it too extensive, reduced it to three, and fortified it with eleven bastions and three gates; all the rest they razed to the foundation, demolishing temples, palaces, and the most beautiful monuments. In 1570 it was besieged forty-five days by the Turks, and then taken by a general assault. There are plantations of olives, almonds, lemons, oranges, mulberries, and cypress-trees, interspersed among the houses. The church of St. Sophia is an old Gothic structure, which the Turks have turned into a mosque; and in that of St. Nicholas the principal merchants assemble to transact commercial business. The bazar is extensive, well supplied with provisions, and remarkably clean. Lon. 33. 16 E. Lat. 35. 30 N.

NICOT (John), lord of Villemain, and master of requests of the French king's household, was born at Nismes, and was sent ambassador to Portugal in 1559; whence he brought the plant which, from his name, was called Nicotiana, but is now more generally known by the name of tobacco. He died at Paris in 1603. He wrote a French and Latin dictionary in folio; a treatise on navigation; and other works.

NICOTIANA. Tobacco. In botany, a genus of the class pentandria, order monogynia. Corol funnel-form, with a plaited border; stamens inclined; capsule two-valved, two-celled. Seven species. North America, Peru, and China. The following are chiefly cultivated.

1. N. fruticosa. Shrubby tobacco. Leaves lanceolate, slightly petioled, clasping the stem, which rises about five feet high, and is shrubby: flowers acute, of a bright purple colour, succeeded by acute, pointed seed-vessels. There is a variety with white flowers. A native of China and the Cape.

2. N. rustica. Common or English tobacco. Stalks rising more than three feet high; leaves smooth, alternate, petioled, ovate, very entire; flowers obtuse, of a yellow colour, in small loose bunches, on the top of the stalks. It is a native of America; and called English tobacco from its having been the first of the different species introduced into England, and from its thriving amongst us better than any other species. There is also a variety of this species with stronger stalks and leaves, and larger flowers.

3. N. tabacum. Virginian tobacco. Large, long, annual root; upright, strong, round, hairy stalk, branching towards the top; leaves numerous, large, pointed, entire, veined, viscid, pale-green; bractes long, linear, pointed; flowers in loose clusters or pansiles; calyx hairy about half the length of the corol, cut into five narrow segments; tube of the corol hairy, gradually swelling towards the border, where it divides into five folding acute segments of a reddish colour. A native of Virginia. It flowers in July and August, and is sometimes brought to market in pots, and is called Oronoko tobacco.

This plant is called nicotiana after Mr. Nicot, who first took it to France. Employed medicinally it is a very active narcotic and sternutatory. A decoction of the leaves is much esteemed in some diseases of the skin, and it is by some said to be a specific against the itch. The fumes and the decoction are employed in obstinate constipations of the bowels, and very frequently with success; it is necessary, however, to caution the practitioner against an effect mostly produced by its exhibition, namely, syncope, with cold sweats; and in some instances death.

The nicotiana rustica, or English tobacco, possesses similar qualities, but in a much weaker degree. The leaves are chiefly used to smoke vermin; though from their milder operation they promise to be, in many cases, a safer remedy than the Virginian tobacco.

NICOYA, a town of Mexico, in Costa Rica, situate on the Dispensa, which runs into the bay of Salinas, where there is a pearl fishery. It is 98 miles W.N.W. of Cartago. Lon. 85 40 W. Lat. 10. 40 N.

NICROPHORUS. In the entomological system of Fabricius, a tribe of the Linnéan genus SILPHA, which see.

To NICTATE. *v. a.* (*nicto*, Latin.) To wink (*Ray*).

NICTITANT MEMBRANE, in natural history, a thin membrane which covers the eyes of birds and fishes, sheltering them from too much light or external injuries, and through which they can see pretty distinctly.

NIDE. Among sportsmen, a term applied to the offspring or produce of the cock and hen pheasant, so long as they continue to clutch or brood together, before they separate, and are able to provide for themselves. It is usual to say, a nide of pheasants; a covey of partridges; a clutch of chicken; a setting of gulls; and a brood of ducks.

NIDGET. *s.* (corrupted from *nithing* or *niding*.) A dastard; a coward (*Camden*).

NIDIFICATION. *s.* (*nidificatio*, Lat.) The act of building nests (*Derham*).

NIDING. *a.* (from nið, Saxon, vileness.) Abject; base-minded: coward (*Carew*).

NIDOROUS. *a.* (*nidoreux*, Fr. from *nider*, Latin.) Resembling the smell or taste of roasted fat (*Bacon*).

NIDOROSITY. *s.* (from *nidorous.*) Eructation with the taste of undigested roast-meat (*Floyer*).

NIDULATION. *s.* (*nidulor*, Latin.) The time of remaining in the nest (*Brown*).

NIDUS, among naturalists, signifies a nest or proper repository for the eggs of birds, insects, &c. where the young of these animals are hatched and nursed.

NIECE. *s.* (*niece, niepce*, Fr. *neptis*, Latin.) The daughter of a brother or sister (*Waller*).

NIEMECZ, a strong town of Moldavia, between Soczowav and Brassaw, being 25 miles from each Lon. 26. 16 E. Lat. 46. 58 N.

NIEMEN, a large river in Poland, which rises in Lithuania, and passes by Bielica and Grodno: it afterward runs through part of Samogitia, and Eastern Prussia, and enters the Curish Haff by several mouths, of which the principal and most northern is called the Russ.

NIENBURG, a strong town of Westphalia, in the county of Hoya, with a considerable trade in corn and wool; seated on the Weser, 37 miles S.S.E. of Bremen. Lon. 9. 15 E. Lat. 52. 39 N.

NIENBURG, a town of Westphalia, in the principality of Munster, seated on the Dinkel, 33 miles N.W. of Munster.

NIEPER, a large river of Europe, and one of the most considerable of the north, formerly called the Borysthenes. Its source is in the middle of Muscovy, running west by Smolensko, as far as Orsa: and then turns south, passing by Mohilow, Bohaczo, Kiow, Czyrkassy, the fortress of Kudak, Dassau, and Oczakow, falling into the Black Sea; as also in its course it divides Little Tartary from Budziac Tartary.

NIESTER, a large river of Poland, which has its source in the lake Niester, in the palatinate of Lemburg, where it passes by Halicz. Then it separates Podolia and Oczakow Tartary from Moldavia and Budziac Tartary; and falls into the Black Sea at Belgorod, between the mouths of the Nieper and the Danube.

NIEUPORT, a seaport of the Netherlands, in Flanders, at the mouth of the Yperlee. Here are sluices, by which the country can be laid under water. The inhabitants are principally fishermen, who subsist by the herring fishery, and by making nets and ropes. In 1606 prince Maurice gained here a great victory over the Spaniards. It has been often taken in subsequent wars; the last time by the French in 1794. It is nine miles S.W. of Ostend. Lon. 2. 45 E. Lat. 51. 8 N.

NIEUPORT, a town of Holland, on the river Leck, 15 miles E. of Rotterdam.

NIEVRE, a department of France, including the late province of Nivernois. It takes its name from a small river, which rises near Champlemy, and runs into the Loire at Nevers, the chief town of the department.

NIEUWENTYT (Bernard), an eminent Dutch philosopher and mathematician, was born on the 10th of August 1654, at Westgraafdyk in North Holland, where his father was minister. He discovered very early a good genius and a strong inclination for learning; which was carefully improved by a suitable education. He had also that prudence and sagacity, which led him to pursue literature by sure and proper steps, acquiring a kind of mastery in one science before he proceeded to another. His father had designed him for the ministry; but seeing his inclination did not lie that way, he prudently left him to pursue the bent of his genius. Accordingly young Nieuwentyt, apprehending that nothing was more useful than fixing his imagination and forming his judgment well, applied himself early to logic, and the art of reasoning justly, in which he grounded himself upon the principles of Des Cartes, with whose philosophy he was greatly delighted. From thence he proceeded to the mathematics, in which he made a considerable proficiency; though the application he gave to that branch of learning did not hinder him from studying both law and physic. In fact, he succeeded in all these sciences so well, as deservedly to acquire the character of a good philosopher, a great mathematician, an expert physician, and an able and just magistrate.

Although he was naturally of a grave and serious disposition, yet he was very affable and agreeable in conversation. His engaging manner procured the affection of every one; and by this means he often drew over to his opinion those who before differed very widely from him. Thus accomplished, he acquired a great esteem and credit in the council of the town of Puremerende, where he resided; as he did also in the states of that province, who respected him the more, inasmuch as he never engaged in any cabals or factions in order to secure it; regarding in his conduct, an open, honest, upright behaviour, as the best source of satisfaction, and relying solely on his merit. In fact, he was more attentive to cultivate the sciences, than eager to obtain the honours of the government; contenting himself with being counsellor and burgomaster, without courting or accepting any other posts, which might interfere with his studies, and draw him too much out of his library. He died in 1718, at the age of sixty-three, having been twice married. He was the author of various works, among which are, Considerationes circa Analyseos ad quantitates Infinite parvas applicatæ Principia, &c. 1694, octavo; in which he proposed some difficulties on the subject of the analysis of infinitessimals. Analysis Infinitorum, seu Curvilineorum proprietates, ex Polygonorum deductæ, 1696, quarto; which is a sequel to the former, with attempts to remove those difficulties. Considerationes Secundæ circa Calculi Differentialis Principiæ, et Responsio ad Virum nobilissum G. G. Leibnitium, &c. 1696, quarto; occasioned by an attack of Leibnitz on the author's Analysis, in the Leipsic Journal for 1695. A Treatise on the new Use of the Tables of Sines and

Tangents, 1714. The proper Use of the Contemplation of the Universe, for the Conviction of Atheists and Unbelievers, 1715, quarto; of which a French translation was published at Paris, in 1725, quarto, entitled, L'Existence de Dieu demontrée par les Merveilles de la Nature; and also an English one at London, in 1716, in three volumes, octavo, under the title of The Religious Philosopher, or the right Use of contemplating the Works of the Creator. A memoir inserted in a Dutch journal, entitled, Bibliothéque de l'Europe, for the year 1716, in defence of the preceding work against a criticism of M. Bernard, in the Nouvelles de la Republique des Lettres. A Letter to M. Bothnia de Burmania, on his Article concerning Meteors, inserted in the Nouvelles litter. du 22 Avril, 1719; and about a month before his death he put the finishing hand to an excellent refutation of Spinoza, which was published in Dutch at Amsterdam, in 1720, quarto.

NIGELLA. Fennel-flower. Devil in a bush. In botany, a genus of the class polyandria, order pentagynia. Calyxless; petals five; nectaries from five to ten, two-lipped, within the corol; capsules from five to ten united. Five species, natives of the south of Europe.

They are all annual plants, rising from a foot to a foot and a half high, adorned with blue or white flowers. They are cultivated by sowing their seeds in March, upon a bed of light earth, in the place where the plants are to remain; and if they be allowed to scatter their seeds, they will be propagated without any farther trouble.

NIGER (C. Pescennius Justus,) a celebrated governor in Syria, well known by his valour in the Roman armies, while yet a private man. At the death of Pertinax, he was declared emperor of Rome, and he supported that elevated situation, by prudence of mind, moderation, courage, and virtue. He was remarkable for his fondness of ancient discipline, and never suffered his soldiers to drink wine. He forbad the use of silver or gold utensils in his camp. In his punishments, Niger was inexorable. Such qualifications seemed to promise the restoration of ancient discipline, but the death of Niger frustrated every hope of reform. Severus, who had also been invested with the imperial purple, marched against him, and Niger was, at last, defeated, A.D. 194. His head was cut off, and affixed to a long spear, and carried in triumph through the streets of Rome. He reigned about one year.

NIGER, a large river of Africa, which rises in the same mountains as the Senegal, in the W. part of Negroland. It flows N. through the country of Mandingo, and then takes an easterly course through the kingdoms of Bambara, Tombuctoo, Trocur, and Ghana, to Wangara, where it divides into several branches, and is supposed to lose itself in the lakes and sandy deserts to the E. and S. of that country. The Moors and Arabs call it Neel il Abeed, or River of Slaves, and Neel Kibeer, or Great River. In the rainy season it swells above its banks, and floods the adjacent lands.

NI'GGARD. *s.* (*ninggr*, Islandick.) A miser; a curmudgeon (*Sidney*).

NI'GGARD. *a.* 1. Sordid; avaricious; parsimonious (*Dryden*). 2. Sparing; wary (*Shaks.*).

To NI'GGARD. *v. a.* (from the noun.) To stint; to supply sparingly (*Shakspeare*).

NI'GGARDISH. *a.* (from *niggard*.) Having some disposition to avarice.

NI'GGARDLINESS. *s.* (from *niggardly*.) Avarice; sordid parsimony (*Addison*).

NI'GGARDLY. *a.* (from *niggard*.) 1. Avaricious; sordidly parsimonious (*Hall*). 2. Sparing; wary (*Sidney*).

NI'GGARDLY. *ad.* Sparingly; parsimoniously.

NI'GGARDNESS. *s.* (from *niggard*.) Avarice; sordid parsimony: not used (*Sidney*).

NIGH. *prep.* (nyh, Saxon.) At no great distance from (*Garth*).

NIGH. *ad.* 1. Not at a great distance (*Philippians*). 2. To a place near (*Milton*).

NIGH. *a.* 1. Near; not distant; not remote (*Prior*). 2. Allied closely by blood (*Knolles*).

To NIGH. *v. n.* (from the participle.) To approach; to advance; to draw near (*Spenser*).

NI'GHLY. *ad.* (from *nigh*, the adjective.) Nearly; within a little (*Locke*).

NI'GHNESS. *s.* (from *nigh*.) Nearness; proximity.

NIGHT. *s.* (*nauts*, Gothick; niht, Saxon.) 1. The time of darkness; the time from sunset to sunrise (*Crashaw*). 2. The end of the day of life; death (*Dryd.*). 3. State or time of ignorance or obscurity.

To-NIGHT. *adverbially*. In this night; at this night (*Joshua*).

NIGHT, that part of the natural day during which the sun is underneath the horizon; or that space wherein it is dusky. Night was originally divided by the Hebrews, and other eastern nations, into three parts or watchings. The Romans, and afterwards the Jews from them, divided the night into four parts or watchings, the first of which began at sun-set and lasted till nine at night, according to our way of reckoning; the second lasted till midnight; the third till three in the morning; and the fourth ended at sun-rise. The ancient Gauls and Germans divided their time not by days but by nights; and the people of Iceland and the Arabs do the same at this day. The like is also observed of our Saxon ancestors.

NIGHTBRA'WLER. *s.* (*night* and *brawler*.) One who raises disturbances in the night (*Shakspeare*).

NI'GHTCAP. *s.* (*night* and *cap*.) A cap worn in bed, or in undress (*Swift*).

NI'GHTCROW. *s.* (*night* and *crow*.) A bird that cries in the night (*Shakspeare*).

NI'GHTDEW. *s.* (*night* and *dew*.) Dew that wets the ground in the night (*Dryden*).

NI'GHTDOG. *s.* (*night* and *dog*.) A dog that hunts in the night (*Shakspeare*).

NI'GHTDRESS. *s.* (*night* and *dress*.) The dress worn at night (*Pope*).

NI'GHTED. *a.* (from *night.*) Darkened; clouded; black (*Shakspeare*).

NIGHTFA'RING. *a.* (*night* and *fare.*) Travelling in the night (*Gay*).

NI'GHTFIRE. *s.* (*night* and *fire.*) Ignis fatuus; Will-a-Wisp (*Herbert*).

NI'GHTFLY. *s.* (*night* and *fly.*) Moth that flies in the night (*Shakspeare*).

NIGHTFO'UNDERED. *a.* (from *night* and *founder.*) Lost or distressed in the night (*Milton*).

NI'GHTGOWN. *s.* (*night* and *gown.*) A loose gown used for an undress (*Pope*).

NI'GHTHAG. *s.* (*night* and *hag.*) Witch supposed to wander in the night (*Milton*).

NIGHT-HOOKS, in angling, hooks connected in a particular manner for the purpose of catching fishes at night, when the angler is not present. They should be thus laid: procure a small cord sixteen yards long, and at equal distances tie to it five or six hempen lines, of the thickness of the trolling-line, about eighteen inches long apiece, fastening them in such a manner as that you may easily remove or replace them. To each of these whip a hook, and bait it with a minnow, loach, or bull-head, his gill-fins cut off; or, for want of these, with a small gudgeon, a small roach, a piece of seven-eyes of about an inch, and the brightest coloured you can get, which is the preferable bait for eels, or one of the small brood of eels, or with beef, or the pith and marrow in an ox or cow's back-bone. If you bait with a fish, put the point of the hook in at the tail and out at the mouth, the head of the fish resting on the hook's bent; and cover the point of the hook with a small worm: then at one end of the cord fasten a stone or a lead weight of about two pounds, and throw it across the river in some still deep, or at the tail or side of a deep stream. Fasten the other end to some bough or stick, on the water-bank you stand on; and in the morning you will seldom fail to find fishes ensnared. Use a great fish-needle to draw the line through the bait, and out at its tail, and then let it slip down to the hook's bent, the head being downwards, tying the tail to the line with thread, and the top of the hemp line to the cord.

Eels, chub, large trouts, and pike, are taken this way; but if you lay for pike, keep the bait with a float about a foot from the bottom. For other fishes let it touch the bottom.

NIGHTINGALE, in ornithology. See MOTACILLA.

NI'GHTLY. *ad.* (from *night.*) 1. By night (*Shakspeare*). 2. Every night (*Addison*).

NI'GHTLY. *a.* (from *night.*) Done by night; acting by night (*Dryden*).

NI'GHTMAN. *s.* (*night* and *man.*) One who carries away ordure in the night.

NIGHTMARE. Incubus. Oneirodynia gravans. Nervous or indisposed persons are oppressed during sleep with a heavy pressing sensation on the chest, by which respiration is impeded, or the circulation of blood interrupted, to such a degree as to threaten suffocation. Frightful ideas are recollected on waking, which occupied the dreaming mind. Frequent attempts are make to cry out, but often without effect, and the horrors and agitations felt by the patient are inexpressibly frightful. The sensations generally originate in a large quantity of wind, or indigestible matter in the stomach of supper-eaters, which pressing the stomach against the diaphragm, impede respiration, or render it short and convulsed. Inflated intestines may likewise produce similar effects, or mental perturbations.

There is another species of nightmare mentioned by authors, which has a more dangerous tendency; and this arises from an impeded circulation of blood in the lungs, when lying down, or too great relaxation of the heart and its impelling powers. Epilepsy, apoplexy, or sudden death, are sometimes among the consequences of this species of disturbed sleep. Polypi in the large vessels, aneurisms, water in the thorax, pericardium, or lungs, empyema, &c. are amongst the most dangerous causes. See ONEIRODYNIA. Horses are supposed by many naturalists to be subject to the same disease.

NI'GHTPIECE. *s.* (*night* and *piece.*) A picture so coloured as to be supposed seen by candlelight, not by the light of the day (*Addison*).

NI'GHTRAIL. *s.* (*night* and ꞃeꝫl, Saxon, a gown.) A loose cover thrown over the dress at night (*Addison*).

NI'GHTRAVEN. *s.* (*night* and *raven*). A bird supposed of ill omen, that cries loud in the night (*Spenser*).

NI'GHTROBBER. *s.* (*night* and *robber.*) One who steals in the dark (*Spenser*).

NI'GHTRULE. *s.* (*night* and *rule.*) A tumult in the night (*Shakspeare*).

NIGHTSHADE, in botany. See SOLANUM.

NIGHTSHADE (American), See PHYTOLACCA.

NIGHTSHADE (Deadly). See ATROPA.

NIGHTSHADE (Malabar). See BOSELLA.

NIGHTSHADE (Woody). See DULCAMARA.

NI'GHTSHINING. *a.* (*night* and *shine.*) Shewing brightness in the night (*Wilkins*).

NI'GHTSHRIEK. *s.* (*night* and *shriek.*) A cry in the night (*Shakspeare*).

NI'GHTTRIPPING. *a.* (*night* and *trip.*) Going lightly in the night (*Shakspeare*).

NI'GHTWALK. *s.* (*night* and *walk.*) Walk in the night (*Walton*).

NI'GHTWALKER. *s.* (*night* and *walk.*) One who roves in the night upon ill designs (*Ascham*).

NI'GHTWARBLING. *a.* (*night* and *warble.*) Singing in the night (*Milton*).

NI'GHTWARD. *a.* (*night* and *ward.*) Approaching toward night (*Milton*).

NI'GHTWATCH. *s.* (*night* and *watch.*) A period of the night as distinguished by change of the watch (*Psalms*).

NIGRE'SCENT. *a.* (*nigrescens*, Lat.) Growing black; approaching to blackness.

NIGRIFICATION. *s.* (*niger* and *facio*, Lat.) The act of making black.

NIGRINE, in mineralogy, a species of TITANIUM, which see.

NIGRITIA. See NEGROLAND.

NIHILITY. *s.* (*nihilité*, Fr.) Nothingness; the state of being nothing (*Watts*).

NIHILUM ALBUM. See ZINCUM CALCINATUM.

NILE, a great river of Africa, which, according to Mr. Bruce, rises in Abyssinia, near the village of Geesh, in lon. 36. 55 E. lat. 10. 59 N. It runs first through the lake Dembea, then makes a circuit towards its source, which it leaves 25 miles to the E. and enters into Nubia, through which country it makes a circuitous course, and forms some considerable cataracts. It then flows almost directly S. through Egypt, till it arrives at Cairo; and a little below that city it divides into two great branches, which, with the Mediterranean sea, form the island called Delta. The ancients reckoned eleven mouths of the Nile, of which seven were considerable; but now there are only two that are navigable at all times; and those are at Rosetto and Damietta. In the middle of this river, between Old Cairo and Gizeh, is seated the island of Rodda, which is almost as long as Old Cairo, and 500 paces in breadth in the middle; and the front of the Mekias takes up all the breadth of the southern part. This is the work of the Saracens, and derives its name from its use, for it signifies measure. In reality they observe there every day, by means of a graduated column, the increase or decrease of the waters of the Nile. This river overflows regularly every year, from the 15th of June to the 17th of September, when it begins to decrease. The fertility of Egypt depends upon the overflowing of the Nile; and they reckon it will be a bad year when it is less than 14 cubits, or above 18; but 16 cubits is the proper height. During the inundation, the little towns, standing upon eminences, look like so many islands, and they go from one to the other by boats. In Cairo there is a canal called Khalis, which is opened when the water is high enough; thence it is conveyed into reservoirs and cisterns, and is afterwards distributed into the fields and gardens, as occasion requires. This inundation of the Nile is caused by the periodical rains which fall every year between the tropics, and more particularly in Abyssinia, which is full of high mountains.

NIL GHAU, in mastiology. See ANTELOPE.

To NILL. *v. a.* (from *ne will.*) Not to will; to refuse; to reject (*Ben Jonson*).

NILL. *s.* The shining sparks of brass in trying and melting the ore.

NILOMETER, or NILOSCOPE, an instrument used among the ancients to measure the height of the water of the river Nile in its overflowings. The word comes from Νειλος, Nile (and that from νεα ιλυς, new mud, or, as some others will have it, νεω, I flow, and ιλυς, mud,) and μετρον, measure. The Greeks more ordinarily call it Νειλοσκοπιον. The nilometer is said, by several Arabian writers, to have been first set up, for this purpose, by Joseph, during his regency in Egypt: the measure of it was 16 cubits, this being the height of the increase of the Nile, which was necessary to the fruitfulness of Egypt. From the measure of this column, Dr. Cumberland deduces an argument, in order to prove that the Jewish and Egyptian cubit were of the same length.

The only rational and consistent account which we have of the nilometer is given by the celebrated traveller Mr. Bruce. "On the point of the island Rhode, between Geeza and Cairo, near the middle of the river, is a round tower inclosing a neat well or cistern lined with marble. The bottom of this well is on the same level with the bottom of the Nile, which has free access to it through a large opening like an embrasure. In the middle of the well rises a thin column of eight faces of blue and white marble; of which the foot is on the same plane with the bottom of the river. This pillar is divided into 20 pecks, of 22 inches each. Of these pecks the two lowermost are left, without any division, to stand for the quantity of sludge which the water deposits there. Two pecks are then divided, on the right-hand, into 24 digits each; then on the left, four pecks are divided into 24 digits; then on the right, four; and on the left another four: again, four on the right, which completes the number of 18 pecks from the first division marked on the pillar, each peck being 22 inches. Thus the whole marked and unmarked amounts to something more than 36 feet English.

On the night of St. John, when, by the falling of the dew, they perceive the rain-water from Ethiopia mixed with the Nile at Cairo, they begin to announce the elevation of the river, having then five pecks of water marked on the nilometer, and two unmarked for the sludge, of which they take no notice. Their first proclamation, supposing the Nile to have risen 12 digits, is 12 from 6, or it wants 12 digits to be six pecks. When it has risen three more, it is nine from six; and so on, till the whole 18 be filled, when all the land of Egypt is fit for cultivation. Several canals are then opened, which convey the water into the desart, and hinder any further stagnation on the fields. There is indeed a great deal of more water to come from Ethiopia; but were the inundation suffered to go on, it would not drain soon enough to fit the land for tillage: and to guard against this mischief is the principal use of the nilometer; though the Turkish government makes it an engine of taxation.

To NIM. *v. a.* (*nemen*, Dutch, to take.) To take. In cant, to steal (*Hudibras*).

NIMBLE. *a.* (from *nim*; or numan, Saxon, tractable.) Quick; active; ready; speedy; lively; expeditious (*Spenser*).

NIMBLENESS. *s.* (from *nimble.*) Quickness; activity; speed; agility (*Hooker*).

NIMBLEWITTED. *a.* (*nimble* and *wit.*) Quick; eager to speak (*Bacon*).

NI'MBLY. *ad.* (from *nimble.*) Quickly; speedily; actively (*Boyle*).

NI'MBLESS. *s.* Nimbleness (*Spenser*).

NIMBUS, in antiquity, a circle observed on certain medals, or round the heads of some emperors; answering to the circles of light drawn round the images of saints.

NIMEGUEN, a large, handsome, and strong town of the Netherlands, and capital of Dutch Guelderland, with a citadel, an ancient palace, and several forts. It is noted for the peace concluded there in 1679. It has a magnificent town-house, and the inhabitants are greatly given to trade. It is seated on the Vahal or Wahal, between the Rhine and the Maese. It is the utmost eastern boundary of the Netherlands. It contains two Dutch churches, a French Calvinist, and a Lutheran church, five Popish, and several hospitals. It was once a Hans-town and an imperial city. It has a canal to Arnheim, and considerable trade to some parts of Germany: it trades also in fine beer-brewing, fattening of cattle, and exporting of its butter, which is extremely good, into all the other provinces. It is in lon. 5. 50 E. Lat. 51. 55 N.

NI'MIETY. *s.* (*nimietas*, school Latin.) The state of being too much.

NI'MMER. *s.* (from *nim.*) A thief; a pilferer.

NIMPO, a city and sea-port town of China, in the province of Chekiang. It is seated on the eastern sea of China, over-against Japan. It is a city of the first rank, and stands at the confluence of two small rivers, which, after their union, form a channel that reaches to the sea, and is deep enough to bear vessels of 200 tons burden. The walls of Nimpo are 5000 paces in circumference, and are built with freestone. There are five gates, besides two water-gates for the passage of barks into the city; a tower several stories high, built of bricks; and a long bridge of boats fastened together with iron chains, over a very broad canal. This city is commanded by a citadel built on a very high rock, by the foot of which all vessels must necessarily pass. The Chinese merchants of Siam and Batavia go to this place yearly to buy silks, which are the finest in the empire. They have also a great trade with Japan, it being but two days sail from hence: thither they carry silks, stuffs, sugar, drugs, and wine; and bring back copper, gold, and silver. Lon. 122. 0 E. Lat. 30. 0 N.

NIMROD, in scripture history, the sixth son of Cush, and "a mighty hunter before the Lord." He soon became very powerful in the earth. The foundation of his empire was at Babylon, which he built in the same place, or very near that, where the tower of Babel stood. After having subdued all the neighbouring country, he advanced, according to Bochart, into Assyria, and built Nineveh, Rehoboth, Calah, and Resen.

NI'NCOMPOOP. *s.* (A corruption of the Lat. *non compos.*) A fool; a trifler (*Addison*).

NINE. *s.* (nigon, Saxon.) One more than eight.

NINE, the last of the radical numbers or characters; from the combination of which any definite number, however large, may be produced. "It is observed by arithmeticians (says Hume), that the products of 9 compose always either 9 or some lesser products of 9, if you add together all the characters of which any of the former products is composed: thus, of 18, 27, 36, which are products of 9, you make 9, by adding 1 to 8, 2 to 7, 3 to 6. Thus 369 is a product also of 9; and if you add 3, 6, and 9, you make 18, a lesser product of 9." See Hume's Dialogues on Nat. Relig. p. 167, 168, &c. 2d edit.

NI'NEFOLD. *a.* (*nine* and *fold.*) Nine times.

NI'NEPINS. *s.* (*nine* and *pin.*) A play where nine pieces of wood are set up on the ground to be thrown down by a bowl (*Peacham*).

NI'NESCORE. *a.* (*nine* and *score.*) Nine times twenty (*Addison*).

NI'NETEEN. *a.* (nigonτyne, Sax.) Nine and ten; one less than twenty.

NI'NETEENTH. *a.* (nig nτeoða, Saxon.) The ordinal of nineteen; the ninth after the tenth.

NI'NETIETH. *a.* (hundnigonτeogoða, Sax.) The tenth nine times told.

NI'NETY. *a.* (hundnigonτig, Saxon.) Nine times ten.

NINEVEH (anc. geog.), the capital city of Assyria, founded by Ashur the son of Shem (Gen. x. 11.); or, as others read the text, by Nimrod the son of Cush. However this be, yet it must be owned, that Nineveh was one of the most ancient, the most famous, the most potent, and largest cities of the world. It is very difficult exactly to assign the time of its foundation; but it cannot be long after the building of Babel. It was situated upon the banks of the Tigris; and in the time of the prophet Jonas, who was sent thither under Jeroboam II. king of Israel, and, as Calmet thinks, under the reign of Pul, father of Sardanapalus, king of Assyria, Nineveh was a very great city, its circuit being three days journey (Jonah iii. 3.) Diodorus Siculus, who has given us the dimensions of it, says it was 480 stadia in circumference, or 47 miles; and that it was surrounded with lofty walls and towers; the former being 200 feet in height, and so very broad that three chariots might drive on them abreast; and the latter 200 feet in height, and 1500 in number; and Strabo allows it to have been much greater than Babylon. Diodorus Siculus was, however, certainly mistaken, or rather his transcribers, as the authors of the Universal History think, in placing Nineveh on the Euphrates, since all historians as well as geographers who speak of that city, tells us in express terms that it stood on the Tigris. At the time of Jonah's mission thither, it was so populous, that it was reckoned to contain more than six score thousand persons, who could not distinguish their right hand from their left (Jon. iv. 11.), which is generally explained of young children

that had not yet attained to the use of reason; so that upon this principle it is computed that the inhabitants of Nineveh were then above 600,000 persons.

Nineveh was taken by Arbaces and Belesis, in the year of the world 3257, under the reign of Sardanapalus, in the time of Ahaz king of Judah, and about the time of the foundation of Rome. It was taken a second time by Astyages in 3378, after which it never recovered its former splendour.

NI'NNY. *s.* (*ninno*, a child, Spanish.) A fool; a simpleton (*Swift*).

NI'NNYHAMMER. *s.* (from *ninny*.) A simpleton (*Arbuthnot*).

NINSI RADIX. Ninzin. Nindsin. This root was long supposed to be the same as ginseng. It now appears, however, to be the produce of a different plant, the sium ninsi, foliis serratis, pinnatis; rameis ternatis of Linnéus, possessing similar though weaker properties than ginseng.

NINZIN. See NINSI RADIX.

NINTH. *a.* (neᵹoða, Saxon.) The first after the eighth; the ordinal of nine.

NINTH, in music, an interval containing an octave and a tone. Also the name given to the chord consisting of the common chord with the eighth advanced one note.

NINUS, a son of Belus, who founded the Assyrian monarchy, B. C. 2059. He was very warlike, and extended his conquests from Egypt to the extremities of India and Bactriana. He became enamoured of Semiramis, the wife of one of his officers, and he married her after the death of her husband. Ninus reigned 52 years, and left his kingdom to the care of his wife Semiramis, by whom he had a son. The history of Ninus is very obscure.

NINYAS, a son of Ninus and Semiramis king of Assyria, succeeded his mother who had voluntarily abdicated the crown. The reign of Ninyas is remarkable for its luxury and extravagance. His successors imitated the example of his voluptuousness, and therefore their name is little known till the age of Sardanapalus.

NIO, an island of the Archipelago, between Naxi to the north, Armago to the east, Santerino to the south, and Sikino to the west, and is about 35 miles in circumference. It is remarkable for nothing but Homer's tomb, which they pretend is in this island; for they affirm that he died here in his passage from Samos to Athens. The island is well cultivated, and not so steep as the other islands, and the wheat which it produces is excellent; but oil and wood are scarce. It is subject to the Turks. Lon. 25. 53 E. Lat. 36. 35 N.

NIOBE, in fabulous history, a daughter of Tantalus, king of Lydia, by Euryanassa or Dione. She married Amphion the son of Jasus, by whom she had, according to different writers and mythologists, a different number of children. The most received opinion is, that she had seven sons and seven daughters. This number increased her pride, and she had the imprudence not only to prefer herself to Latona who had only two children, but even to ridicule the worship paid to her, observing that she had a better claim to sacrifices than the mother of Apollo and Diana. This insolence provoked Latona. She entreated her children to punish the arrogant Niobe. Her prayers were heard, and immediately all the sons of Niobe expired by the darts of Apollo, and all the daughters, except Chloris, were equally destroyed by Diana; and Niobe, struck at the suddenness of her misfortunes, was changed into a stone. The carcases of Niobe's children, according to Homer, were left unburied for nine days, because Jupiter changed into stones all such as attempted to inter them. On the tenth day they were honoured with a funeral by the gods.

The story of Niobe is beautifully related in the sixth book of the Metamorphoses of Ovid. That poet thus describes her transformation into stone.

Widow'd and childless, lamentable state!
A doleful sight, among the dead she sat;
Harden'd with woes, a statue of despair,
To ev'ry breath of wind unmov'd her hair:
Her cheek still redd'ning, but its colour dead,
Faded her eyes, and set within her head.
No more her pliant tongue its motion keeps,
But stands congeal'd within her frozen lips.
Stagnate and dull, within her purple veins,
Its current stopp'd, the lifeless blood remains.
Her feet their usual offices refuse,
Her arms and neck their graceful gestures lose:
Action and life from every part are gone,
And ev'n her entrails turn to solid stone.
Yet still she weeps; and whirl'd by stormy winds,
Borne thro' the air, her native country finds;
There fix'd, she stands upon a bleaky hill;
There yet her marble cheeks eternal tears distil.

To NIP. *v. a.* (*nijppen*, Dutch.) 1. To pinch off with the nails; to bite with the teeth (*Bacon*). 2. To cut off by any slight means (*Mortimer*). 3. To blast; to destroy before full growth (*Addison*). 4. To pinch as frost (*Shakspeare*). 5. To vex; to bite (*Spenser*). 6. To satirize; to ridicule; to taunt sarcastically (*Ascham*).

NIP. *s.* (from the verb.) 1. A pinch with the nails or teeth (*Ascham*). 2. A small cut (*Shakspeare*). 3. A blast (*Stepney*). 4. A taunt; a sarcasm.

NIPA, in botany, a genus of the class monoesia, order gynandria. Male: calyx an oblong spathe; corol six-petalled; filaments filiform. Female: calyx a spathe; corolless; styleless; stigmaless; drupes numerous, clustered, angular. An East Indian palm with pinnate leaves, male flowers in lateral spikes, female in terminal sessile heads. Only one species.

NIPHON, the largest island of Japan, 600 miles long and 150 broad, containing 55 provinces. It was discovered, in 1542, by the Portuguese, who were cast ashore by a tempest. The chief town is Jedo.

NI'PPER. *s.* (from *nip*.) A satirist (*Ascham*).

NI'PPERS. *s.* (from *nip*.) Small pincers.

Nippers, among farriers, four teeth in the fore-part of a horse's mouth, two in the upper and two in the lower jaw. They appear between the second and third year. See Age of a horse.

Nippers, of a smith or farrier, the pincers with which they cut the nails they have driven in before they rivet them, and which they use in taking off a shoe.

NI'PPINGLY. *ad.* (from *nip.*) With bitter sarcasm.

NIPPLE. *s.* (nypele, Saxon.) 1. The teat; the dug (*Ray*). 2. The orifice at which any animal liquor is separated (*Derham*).

Nipple. The small projecting portion in the middle of the breasts of men and women. It is much larger in the latter, and has an opening in it from the excretory ducts of the lacteal glands.

Nipple wort. See Lampsana.

NIREUS, a king of Naxos, son of Charops and Aglaia, celebrated for his beauty. He was one of the Grecian chiefs during the Trojan war.

NISAN, a month of the Hebrews, answering to our March, and which sometimes takes from February or April, according to the course of the moon. It was the first month of the sacred year, at the coming out of Egypt (Exod. xii. 2.), and it was the seventh month of the civil year. By Moses it is called Abib. The name Nisan is only since the time of Ezra, and the return from the captivity of Babylon.

NISBET (Sir John), lord advocate of Scotland, in the reign of Charles II. who distinguished himself by pleading against the standing militia in that country. He was one of the commissioners appointed to treat with those of England, concerning the union of the two kingdoms.

NISI PRIUS, in law, a judicial writ which lies in cases where the jury being impannelled and returned before the justices of the bank, one of the parties requests to have such a writ for the ease of the country, in order that the trial may come before the justices in the same county on their coming thither. The purport of a writ of *nisi prius* is, that the sheriff is thereby commanded to bring to Westminster the men impannelled, at a certain day, before the justices, *nisi prius justiciarii domini regis ad assisas capiendas venerint.*

NISIBEN, or Nesbin, a very ancient and celebrated town of Diarbeck, now greatly decayed. It is seated in a vast plain, 70 miles S.W. of Diarbekar. Lon. 38. 26 E. Lat. 36. 10 N.

NISIDA, a small island on the coast of Naples, very fertile, and would be more so but for the great number of rabbits. It has a harbour, called Porto Pavone, five miles W.S.W. of Naples.

NISMES, a flourishing city of France, in the department of Gard, with a bishop's see. Here are several monuments of antiquity, of which the amphitheatre, built by the Romans, is the principal. There are likewise the ruins of a temple of Diana, and a grand tower. The Maison Quarrée, or the square house, is a piece of architecture of the Corinthian order, and one of the finest in the world. Nismes was taken by the English in 1417. The inhabitants were all Calvinists; but Lewis XIV, demolished their church, in 1685, and built a castle to keep them in awe. The population of Nismes is computed at near 50,000. It is seated in a plain, abounding in wine and oil, 12 miles N.W. of Arles, and 75 N.E. of Narbonne. Lon. 4. 26 E. Lat. 43. 51 N.

NISSA, or Nessava, a town of Turkey in Europe, in Servia. It was burnt by the imperialists in 1689, and is seated on the Morava, 20 miles E. of Precop, and 120 S.E. of Belgrade. Lon. 22. 32 E. Lat. 43. 32 N.

NISSOLIA, in botany, a genus of the class diadelphia, order decandria. Calyx five-toothed; legume one-seeded, terminating in a ligulate wing. Three species, trees of Carthagena and Guiana.

NISUS, in fabulous history, a son of Hyrtacus, born on mount Ida near Troy. He came to Italy with Æneas, and signalized himself by his valour. He was joined in the closest friendship with Euryalus, and with him he entered in the dead of night the enemy's camp. As they were returning victorious, they were perceived by the Rutulians, who attacked Euryalus. Nisus, in endeavouring to rescue his friend from the enemy's darts, perished himself with him, and their heads were cut off and fixed on a spear, and carried in triumph to the camp. Their death was greatly lamented by all the Trojans. —2. A king of Megara, son of Mars, or more properly of Pandion. He inherited his father's kingdom with his brothers, and received as his portion the country of Megaris. But as the fate of Nisus depended totally upon a yellow lock, which, as long as it continued on his head, according to the words of an oracle, promised him life and success to his affairs; his daughter Scylla stole away the fatal hair from her father's head as he was asleep, and delivered it to Minos king of Crete, who was at war then with the Athenians, and had actually besieged Megara. Scylla had, previously to this action, which was the cause of the surrender of Megara, fallen in love with Minos, upon seeing him from the walls of the town. Minos disregarded the services of Scylla, and she threw herself into the sea. The gods changed her into a lark, and Nisus assumed the nature of the hawk, at the very moment that he gave himself death not to fall into the enemy's hands. These two birds have continually been at variance with each other, and Scylla, by her apprehensions at the sight of her father, seems to suffer the punishment which her perfidy deserved.

NIT. *s.* (hnitu, Saxon.) The egg of a louse, or small animal (*Derham*).

NI'TENCY. *s.* (*nitentia*, Latin.) 1. Lustre; clear bightness. 2. (from *nitor*, Lat.) Endeavour; spring to expand itself.

NITH, a river in Dumfriesshire, which rises in the mountains to the N.W., and gives

the name of Nithsdale to that part of the county through which it flows. A little above Dumfries it joins the Cairne, and their united streams form a fine estuary in Solway Frith.

NI'THING. *s.* (or *niding.*) A coward.

NI'TID. *a.* (*nitidus*, Latin.) Bright; shining; lustrous (*Boyle*).

NITIDULA, in zoology, a genus of the class insecta, order coleoptera. Antennas clavate, the club solid; shells margined; head prominent; thorax a little flattened, margined. Forty-three species, which are thus divided into sections, according to the form of the lip.

A. Lip cylindrical; by far the largest, and comprising thirty-three species.

B. Lip square; comprising ten species, and forming the tribe elophorus of Fabricius.

These insects are chiefly inhabitants of Europe; a few of them of South America; even common to our own country. Those of section B. are for the most part aquatic insects, found in stagnant waters, or under duckweed. The rest are traced on plants and flowers: one only, N. bipustulata, oval, black, with red-dotted shells, feeds on carcases, meat, and bacon.

NITRARIA, in botany, a genus of the class dodecandria, order monogynia. Calyx five-cleft; petals five, arched at the top; stamens fifteen; drupe one-seeded. Two species; one a Tunis plant, with leaves three-toothed at top; the other a spinescent shrub of Siberia, with leaves very entire and obtuse.

NITRAS. See NITRAT.

NITRAS AMMONIACÆ. Alkali volatile nitratum. Sal ammoniacus nitrosus. Ammonia nitrata. Its virtues are irritating, diuretic, and deobstruent; externally it is resolvent and sialagogue.

NITRAS ARGENTI FUSUS. See ARGENTUM NITRATUM.

NITRAS HYDRARGYRI. Hydrargyrum nitrosum. Of this substance there are two preparations, the crystallized and the acid nitrat of quicksilver. Its caustic quality points out its irritating, emetic, diuretic, and alterative virtues. It is used in syphilis and phagedenic ulcers. The unguentum citrinum is prepared from it.

NITRAS POTA'SSÆ. See NITRAT.

NITRAS POTA'SSÆ FUSUS. Sal prunellæ. Nitrum tabulatum. This salt, besides the nitric acid and potash, contains a little sulphuric acid.

NITRAS SODÆ. Alkali minerale nitratum. Nitrum cubicum. Its virtues are similar to those of nitrate of potash, for which it may be safely substituted.

NITRATS, or NITRATES. In chemistry, salts formed by an union of nitric acid with alkalies, earths, or metallic oxyds: the chief of which are as follows:

1. Nitrat of potash, or potass. Nitre. Saltpetre.
2. Nitrat of soda.
3. Nitrat of ammonia.
4. Nitrat of magnesia.
5. Nitrat of lime.
6. Nitrat of baryte.
7. Nitrat of strontian.
8. Nitrat of ammonia and magnesia.
9. Nitrat of alumina.
10. Nitrat of ythia.
11. Nitrat of glucina.
12. Nitrat of zirconia.

These are all distinguished from other salts by the following properties:

1. Soluble in water, and capable of crystallizing by cooling. 2. When heated to redness, along with combustible bodies, a violent combustion and detonation are produced. 3. Sulphuric acid disengages from them fumes, which have the odour of nitric acid. 4. When heated along with muriatic acid, oxymuriatic acid is exhaled. 5 Decomposed by heat, and yield at first oxygen gas. The nitrats at present known are twelve in number. Few of them combine with an excess of acid or of base, so that there are hardly any supernitrats, or subnitrats.

1. *Nitrat of potash.* Nitre. Saltpetre.—This is by far the most important of all the nitrats; and was known to the world long before any of the rest. It is produced naturally in considerable quantities in many places, and it is highly probable that the ancients were acquainted with it; but scarcely any thing certain can be collected from their writings. If Pliny mentions it at all, he confounds it with soda, which was known by the names of nitron and nitrum. It is certain, however, that it has been known in the East from time immemorial. Roger Bacon mentions this salt in the 13th century under the name of nitre.

No phænomenon has excited the attention of chemical philosophers more than the continual reproduction of nitre in certain places after it had been extracted from them. Prodigious quantities of this salt are necessary for the purposes of war; and as nature has not laid up great magazines of it, as she has of some other salts, this annual reproduction is the only source from which it can be procured. It became therefore of the utmost consequence, if possible, to discover the means which nature employed in forming it, in order to enable us to imitate her processes by art, or at least to accelerate and facilitate them at pleasure. Numerous attempts accordingly have been made to explain and to imitate these processes.

Lemery the younger advanced, that all the nitre obtained exists previously in animals and vegetables; and that it is formed in these substances by the processes of vegetation and animalization. But it was soon discovered that nitre exists, and is actually formed in many places where no animal nor vegetable substance had been decomposed; and consequently this theory was as untenable as the former. So far indeed is it from being true that nitre is formed by these processes alone, that the quantity of nitre in plants has been found to depend entirely on the soil in which they grow.

At last, by the numerous experiments of several French philosophers, particularly by those of Thouvenel, it was discovered that nothing else is necessary for the production of nitre than a basis of lime, heat, and an open but not too free communication with dry atmospheric air. When these circumstances combine the acid is first formed, and afterwards the alkali makes its appearance. How the air furnishes materials for this production is easily explained, now that the component parts of the nitric acid are known to be oxygen and azote: but how lime contributes to their union it is not so easy to see. The appearance of the potass is equally extraordinary. If any thing could give countenance to the hypothesis that

potass is composed of lime and azote, it would be this singular fact.

Nitre is found abundantly on the surface of the earth in Egypt, India, South America, Spain, the kingdom of Naples, and many other places. Nitrat of lime, however, is found still more abundantly than nitrat of potash, or common nitre. Far the greater part of nitre employed in manufactories is produced by a combination of circumstances which tend to compose and condense nitric acid. This acid appears to be formed in all situations where animal matters are completely decomposed with access of air, and of proper substances with which it can readily combine. Grounds frequently trodden by cattle, and impregnated with their excrements, or the walls of inhabited places where putrid animal vapours abound, such as slaughter-houses, drains, or the like, afford nitre by long exposure to the air. Artificial nitre beds are made by an attention to the circumstances in which this salt is produced by nature. Dry ditches are dug, and covered with sheds, open at the sides, to keep off the rain: these are filled with animal substances, such as dung, or other excrements, with the remains of vegetables, and old mortar, or other loose calcareous earth; this substance being found to be the best and most convenient receptacle for the acid to combine with. Occasional watering, and turning up from time to time, are necessary, to accelerate the process, and increase the surfaces to which the air may apply; but too much moisture is hurtful. When a certain portion of nitrat is formed, the process appears to go on more quickly: but a certain quantity stops it altogether, and after this cessation the materials will go on to furnish more, if what is formed be extracted by lixiviation. After a succession of many months, more or less, according to the management of the operation, in which the action of a regular current of fresh air is of the greatest importance, nitre is found in the mass. If the beds contained much vegetable matter, a considerable portion of the nitrous salt will be common saltpetre; but, if otherwise, the acid will, for the most part, be combined with the calcareous earth.

To extract the saltpetre from the mass of earthy matter, a number of large casks are prepared, with a cock at the bottom of each, and a quantity of straw within, to prevent its being stopped up. Into these the matter is put, together with wood-ashes, either strewed at top, or added during the filling. Boiling water is then poured on, and suffered to stand for some time; after which it is drawn off, and other water added in the same manner, as long as any saline matter can be thus extracted. The weak brine is heated, and passed through other tubs, until it becomes of considerable strength. It is then carried to the boiler, and contains nitre and other salts; the chief of which is common culinary salt, and sometimes muriate of magnesia.

It is the property of nitre to be much more soluble in hot than cold water; but common salt is very nearly as soluble in cold as in hot water. Whenever, therefore, the evaporation is carried by boiling to a certain point, much of the common salt will fall to the bottom, for want of water to hold it in solution, though the nitre will remain suspended by virtue of the heat. The common salt thus separated is taken out with a perforated ladle, and a small quantity of the fluid is cooled, from time to time, that its concentration may be known by the nitre which crystallizes in it. When the fluid is sufficiently evaporated it is taken out and cooled, and great part of the nitre separates in crystals; while the remaining common salt continues dissolved, because equally soluble in cold and in hot water. Subsequent evaporation of the residue will separate more nitre in the same manner.

This nitre, which is called nitre of the first boiling, contains some common salt; from which it may be purified by solution in a small quantity of water, and subsequent evaporation: for the crystals thus obtained are much less contaminated with common salt than before; because the proportion of water is so much larger with respect to the small quantity contained by the nitre, that very little of it will crystallize. For nice purposes, the solution and crystallization of nitre are repeated four times. The crystals of nitre are usually of the form of six-sided flattened prisms, with diedral summits. Its taste is penetrating; but the cold produced, by placing the salt to dissolve in the mouth, is such as to predominate over the real taste at first. Seven parts of water dissolve two of nitre, at the temperature of sixty degrees: but boiling water dissolves its own weight. One hundred parts of alcohol, at a heat of one hundred and seventy-six degrees, dissolve only 2.9.

The specific gravity of nitre, as ascertained by Dr Watson, is 1.9. Its taste is sharp, bitterish, and cooling. It is very brittle. It is soluble in seven times its weight of water, at the temperature of 60°, and in rather less than its own weight of boiling water. When exposed to a strong heat it melts, and congeals by cooling into an opaque mass, which has been called mineral crystal. Whenever it melts, it begins to disengage oxygen; and, by keeping it in a red heat, about the third of its weight of that gas may be obtained: towards the end of the process azotic gas is disengaged. If the heat be continued long enough, the salt is completely decomposed, and pure potash remains behind. It detonates more violently with combustible bodies than any of the other nitrates. When mixed with one-third part of its weight of charcoal, and thrown into a red-hot crucible, or when charcoal is thrown into red-hot nitre, detonation takes place, and one of the most brilliant combustions that can be exhibited. The residuum is carbonate of potash. A still more violent detonation takes place, if phosphorus is used instead of charcoal. Nitre oxydizes all the metals at a red heat. The composition of nitre, according to Kirwan, is

Acid	44
Potash	51.8
Water	4.2
	100·0

Nitre furnishes all the nitric acid in all its states, employed either by chemists or artists: it is obtained by decomposing it by means of the sulphuric acid. When burnt with tartar, it yields a pure carbonate of potash. In the assaying of various ores it is indispensable, and is equally necessary in the analysis of many vegetable and animal substances. But one of the most important compounds, formed by means of nitre, is gunpowder, which has completely changed the modern art of war. The discoverer of this compound, and the person who first thought of applying it to the purposes of war, are unknown. It is certain, however, that it was used in the fourteenth century. From certain archi es, quoted by Wiegleb, it appears, that cannons were employed in Germany before the year 1372. No traces of it

can be found in any European author, previous to the thirteenth century; but it seems to have been known to the Chinese long before that period. There is reason to believe, that cannons were used in the battle of Cressy, which was fought in 1346. They seem even to have been used three years earlier at the siege of Algesiras; but before this time, they must have been known in Germany, as there is a piece of ordnance at Amberg, on which is inscribed the year 1303. Roger Bacon, who died in 1292, knew the properties of gunpowder; but it does not follow that he was acquainted with its application to fire-arms. See GUNPOWDER. When three parts of nitre, two parts of potash, and one part of sulphur, all previously well dried, are mixed together in a warm mortar, the resulting compound is known by the name of fulminating powder. If a little of this powder be put into an iron spoon, and placed upon burning coals, or held above the flame of a candle, it gradually blackens, and at last melts. At that instant it explodes with a very violent report, and a strong impression is made upon the bottom of the spoon, as if it had been pressed down very violently.

Three parts of nitre, one of sulphur, and one of fine saw-dust, well mixed, constitute what is called the powder of fusion. If a bit of base copper be folded up and covered with this powder in a walnut shell, and the powder be set on fire with a lighted paper, it will detonate rapidly, and fuse the metal into a globule of sulphuret, without burning the shell.

If nitrat of potash be heated in a retort, with half its weight of solid phosphoric or boracic acid, as soon as this acid begins to enter into fusion it combines with the potash, and the nitric acid is expelled, accompanied with a small portion of oxygen gas and nitric oxyd.

Silex, alumine, and barytes, decompose this salt in a high temperature by uniting with its base, as was observed when speaking of aqua fortis. The alumine will effect this even after it has been made into pottery.

The uses of nitre are various. Beside those already indicated, it enters into the composition of fluxes, and is extensively employed in metallurgy; it serves to promote the combustion of sulphur in fabricating its acid; it is used in the art of dying; it is added to common salt for preserving meat, to which it gives a red hue; it is an ingredient in some frigorific mixtures; and it is prescribed in medicine, as cooling, febrifuge, and diuretic, and some have recommended it mixed with vinegar as a very powerful remedy for the sea scurvy.

2. *Nitrat of soda*, formerly called cubic or quadrangular nitre, approaches in its properties the nitrate of potash; but differs from it in being somewhat more soluble in cold water, though less in hot, which takes up little more than its own weight; in being inclined to attract moisture from the atmosphere; and in crystallizing in rhombs, or rhomboidal prisms. It may be prepared by saturating soda with the nitric acid, by precipitating nitric solutions of the metals, or of the earths, except barytes, by soda: by lixiviating and crystallizing the residuum of common salt distilled with three-fourths its weight of nitric acid; or by saturating the mother waters of nitre with soda instead of potash.

This salt has been considered as useless; but professor Proust says, that five parts of it, with one of charcoal and one of sulphur, will burn three times as long as common powder, so as to form an œconomical composition for fire-works.

3. *Nitrat of strontian* may be obtained in the same manner as that of barytes, with which it agrees in the shape of its crystals and most of its properties. It is much more soluble, however, requiring but four or five parts of water according to Vauquelin, and only an equal weight according to Mr. Henry. Boiling water dissolves nearly twice as much as cold. Applied to the wick of a candle, or added to burning alcohol, it gives a deep red colour to the flame. On this account it might be useful, perhaps, in the art of pyrotechny.

4. *Nitrat of lime*, the calcareous nitre of older writers, abounds in the mortar of old buildings, particularly those that have been much exposed to animal effluvia, or processes in which azote is set free. Hence it abounds in nitre beds, as was observed when treating of the nitrat of potash. It may also be prepared artificially by pouring dilute nitric acid on carbonate of lime. If the solution be boiled down to a syrupy consistence, and exposed in a cool place, it crystallizes in long prisms, resembling bundles of needles diverging from a centre. These are soluble, according to Henry, in an equal weight of boiling water, and twice their weight of cold; soon deliquesce on exposure to the air; and are decomposed at a red heat. Fourcroy says, that cold water dissolves four times its weight, and that its own water of crystallization is sufficient to dissolve it at a boiling heat. It is likewise soluble in less than its weight of alcohol. By evaporating the aqueous solution to dryness, continuing the heat till the nitrate fuses, keeping it in this state five or ten minutes, and then pouring it into an iron pot previously heated, we obtain Baldwin's phosphorus. This, which is, perhaps, more properly nitrite of lime, being broken to pieces, and kept in a phial closely stopped, will emit a beautiful white light in the dark, after having been exposed some time to the rays of the sun. At present no use is made of this salt, except for drying some of the gasses by attracting their moisture; but it might be employed instead of the nitrat of potash for manufacturing aqua fortis.

5. The *nitrat of ammonia* possesses the property of exploding, and being totally decomposed, at the temperature of 600°; whence it acquired the name of nitrum flammans. The readiest mode of preparing, is by adding carbonat of ammonia to dilute nitric acid till saturation takes place. If this solution be evaporated in a heat between 70° and 100°, and the evaporation not carried too far, it crystallizes in hexaedral prisms terminating in very acute pyramids; if the heat rise to 212°, it will afford, on cooling, long fibrous silky crystals: if the evaporation be carried so far as for the salt to concrete immediately on a glass rod by cooling, it will form a compact mass. According to Mr. Davy, these differ but little from each other, except in the water they contain, their component parts being as follows:

Prismatic	contains of acid	69.5	ammonia	18.4	water	12.1
Fibrous		72.5		19.3		8.2
Compact		74.5		19.8		5.7

All these are completely deliquescent, but they differ a little in solubility. Alcohol at 176° dissolves nearly 9.9 of its own weight.

The chief use of this salt is for affording nitrous oxyde on being decomposed by heat. See NITROUS OXYDE, under the article GASS.

6. *Nitrat of magnesia*, magnesian nitre, crystallizes in four-sided rhomboidal prisms, with oblique or truncated summits, and sometimes in bundles of small needles. Its taste is bitter, and very similar to that of nitrate of lime, but less pungent. It is fusible, and decomposable by heat, giving out first a little oxygen gass, then nitrous oxyd, and lastly nitric acid. It deliquesces slowly. It is soluble in an equal weight of cold water, and in but little more hot so that it is scarcely crystallizable but by spontaneous evaporation.

The two preceding species are capable of combining in o a triple salt, and ammoniaco-magnesian nitrate, either by uniting the two in solution, or by a partial decomposition of either by means of the base of the other. This is slightly inflammable when suddenly heated: and by a lower heat is decomposed, giving out oxygen, azote, more water than it contained, nitrous oxyd, and nitric acid. The residuum is pure magnesia. It is disposed to attract moisture from the air, but is much less deliquescent than either of the salts that compose it; and requires eleven parts of water at 60° to dissolve it. Boiling water takes up more, so that it will crystallize by cooling. It consists of 78 parts of nitrat of magnesia and 22 of nitrate of ammonia.

From the activity of the nitric acid as a solvent of earths in analyzation, the nitrat of glucine is better known than any other of the salts of this new earth. Its form is either pulverulent, or a tenacious or ductile mass. Its taste is at first saccharine, and afterward astringent. It grows soft by exposure to heat, soon melts, its acid is decomposed into oxygen and azote, and its base alone is left behind. It is very soluble and very deliquescent.

7. *Nitrat, or rather supernitrat, of alumine*, crystallizes, though with difficulty, in thin, soft, pliable flakes. It is of an austere and acid taste, and reddens blue vegetable colours. It may be formed by dissolving in diluted nitric acid, with the assistance of heat, fresh precipitated alumine, well washed but not dried. It is deliquescent, and soluble in a very small portion of water. Alcohol dissolves its own weight. It is easily decomposed by heat.

8. *Nitrat of baryte*, is usually prepared by dissolving native carbonat of baryte in nitric acid, or by decomposing sulphuret of baryte by means of nitric acid, and evaporating the filtered solution till the nitrat crytallizes. Its taste is hot, acrid, and austere: soluble in 12 parts of water at a temperature of 60°, and in about three or four parts of boiling water. As the solution cools, the salt may be obtained in crystals.

9. *Nitrat of ammonia and magnesia*, is prepared by mixing together the solutions of nitrat of ammonia and nitrat of magnesia, or by decomposing either of these salts in part by the base of the other. When the two salts are mixed together the present compound gradually precipitates in crystals; which are in the form of fine prisms, have a bitter ammoniacal taste, and are soluble at 60° in about 11 parts of water. When exposed to the air they gradually attract moisture, but much more slowly than either of their component parts.

10. *Nitrat of glucine*, is prepared by saturating nitric acid with glucina. When the solution is evaporated by means of a low heat, the salt gradually assumes the form of a powder, but cannot be obtained in the state of crystals. Its taste is sweet and astringent: it is exceedingly soluble in water, so that it is extremely difficult to obtain it in a dry state. Evaporated it becomes extremely thick and glutinous, like honey.

11. *Nitrat of zircon* was first discovered by Klaproth, and has since been examined by Guyton-Morveau and Vauquelin. Its crystals are small, capillary, silky needles. Its taste is astringent. It is easily decomposed by fire, very soluble in water, and deliquescent. It may be prepared by dissolving zircon in strong nitric acid; but like the preceding species, the acid is always in excess.

12. *Nitrat of yttria* may be prepared in a similar manner. Its taste is sweetish, and astringent. It is scarcely to be obtained in crystals, and if it be evaporated by too strong a heat, the salt becomes soft like honey, and on cooling concretes into a stony mass. Exposed to the air it deliquesces. See the article NITRIC ACID at its close.

NITRE. (*nitrum*, νιτρον). Nitras potassæ impurus. Salt-petre. A perfect neutral salt formed by the union of the nitrous acid with the fixed vegetable alkali. Its taste is cooling, and it does not alter the colour of the syrup of violets. Nitre exists in large quantities in the earth, and is continually formed in inhabited places; it is found in great quantities upon walls which are sheltered from the rain. It is of great use in the arts; it is the principal ingredient in gunpowder; and burned with different proportions of tartar, forms the substances called fluxes. It is of considerable importance in medicine, as a febrifuge, diuretic, and antiphlogistic remedy.

Real nitre is occasionally found near privies and other places where a putrefaction of animal matter has taken place: whence there is great reason to believe that potash or vegetable alkali is formed in putrefaction, as well as soda: and on this account putrid animal substances are sometimes exposed to the formation of salt-petre: for this purpose putrid blood is generally preferred. See NITRAT OF POTASH.

NITRIA, a famous desert of Egypt, 37 miles in length, on the coast of the Mediterranean Sea. It had formerly a great number of monasteries, which are now reduced to four; and it takes its name from a salt lake, out of which is procured the natrum of the ancients.

NITRIC ACID. An acid procured by a combination of the two constituent elements of the atmospheric air, oxygen and nitrogen in a peculiar proportion to each other. In this manner it may be obtained in sufficient quantity to afford satisfactory evidence of its chemical nature, but for the purposes of the laboratory, and manufacture, it is always procured in a different, and more ready manner from nitre, or nitrat of potash, as it is called in the new nomenclature, by the addition of some substance that has a stronger affinity with potash than the nitric acid has, assisted by distillation.

According to Dr. Davy's calculations this acid consists of 70.5 of oxgen and 29.5 of azote or nitrogen; and if these gases be mixed in this proportion in a glass tube, about a line in diameter,

over mercury, and a series of electric shocks be passed through them for some hours, they will form nitric cid; or, if a solution of potash be present with them, nitrat of potash will be obtained. The constitution of this may be further proved, analytically, by driving it through a red-hot porcelain tube, as thus it will be decomposed into oxygen and nitrogen gases. But for all practical purposes, the nitric acid, as we have just observed, is best obtained from nitrat of potash, from which it is expelled by sulphuric acid.

Four parts of pure nitrat of potash, coarsely powdered, are to be put into a glass retort, and three parts of concentrated sulphuric acid cautiously added, taking care to avoid the fumes that arise, which is best done by standing in a current of air to convey them up the chimney. Join to the retort a tubulated receiver of large capacity, with an adopter interposed, and lute the junctures with a mixture of pipe-clay, sifted sand, and cut tow. In the tubulure fix with fat lute a glass tube terminating in another large receiver, in which is a small quantity of water; and if you wish to collect the gaseous products, let a bent glass tube from the receiver communicate with a pneumatic trough. Apply heat to the receiver by means of a sand bath. The first product that passes into the receiver is generally red and fuming; but the appearances gradually diminish, till the acid comes over pale, and even colourless, if the materials used were clean. After this it again becomes more and more red and fuming, till the end of the operation; and the whole mingled together will be of a yellow or orange colour.

In the large way, and for the purposes of the arts, extremely thick cast iron or earthen retorts are usually employed, to which an earthen head is adapted, and connected with a range of proper condensers. The strength of the acid too is varied, by putting more or less water in the receivers. The nitric acid thus made generally contains sulphuric acid, and also muriatic from the impurity of the nitrat employed. If the former, a solution of nitrat of barytes will occasion a white precipitate: if the latter, nitrat of silver will render it milky. The sulphuric acid may be separated by a second distillation from very pure nitre, equal in weight to an eighth of that originally employed; or by precipitating with nitrat of barytes, decanting the clear liquid, and distilling it. The muriatic acid may be separated by proceeding in the same way with nitrat of silver, or with litharge, decanting the clear liquor, and redistilling it, leaving an eighth or tenth part in the retort. The acid for the last process should be condensed as much as possible, and the redistillation conducted very slowly; and if it be stopped when half is come over, beautiful crystals of muriate of lead will be obtained on cooling the remainder, if litharge be used, as M. Stenacher informs us; who also adds, that the vessels should be made to fit tight by grinding, as any lute is liable to contaminate the product.

As this acid still holds in solution more or less nitrous gass, it is not, in fact, nitric acid, but a kind of nitrous: it is therefore necessary to put it into a retort, to which a receiver is added, the two vessels not being luted, but merely joined by paper; and to apply a very gentle heat for several hours, changing the receiver as soon as it is filled with red vapours. The nitrous gass will thus be expelled, and the nitric acid will remain in the retort, as limpid and colourless as water. It should be kept in a bottle secluded from the light, otherwise it will lose part of its oxygen.

When newly prepared in this manner it is a liquid as transparent and colourless as water; but the affinity between its component parts is so weak, that the action of light is sufficient to drive off a part of its oxygen in the form of gass; and thus, by converting it partly into nitrous gass, to make it assume a yellow colour. Its taste is exceedingly acid and peculiar. It is very corrosive, and tinges the skin of a yellow colour, which does not disappear till the epidermis comes off. It is constantly emitting white fumes which have an acrid disagreeable odour.

It has a strong affinity for water, and has never yet been obtained except mixed with that liquid. When concentrated it attracts moisture from the atmosphere, but not so powerfully as sulphuric acid. It also produces heat when mixed with water, owing evidently to the concentration of the water.

The specific gravity of the strongest nitric acid that can be procured is 1.583; but at the temperature of 60°, Mr. Kirwan could not procure it stronger than 1.5543.

As this liquid acid is a compound of two ingredients, namely, pure nitric acid and water, it becomes an object of the greatest consequence to ascertain the proportion of each of these parts. This problem has lately occupied the attention of Mr. Kirwan, who has endeavoured to solve it in the following manner:

He dried a quantity of crystallized carbonat of soda in a red heat, and dissolved it in water, in such a proportion that 367 grains of the solution contained 50.05 of alkali. He saturated 367 grains of this solution with 147 grains of nitric acid, the specific gravity of which was 1.2754; and which he ascertained to contain 45.7 per cent. of acid, of the specific gravity 1.5543, chosen by him as a standard. The carbonic acid driven off amounted to 14 grains. On adding 939 grains of water the specific gravity of the solution, at the temperature of 58.5°, was 1.0401. By comparing this with a solution of nitrat of soda, of the same density, he found that the salt contained in it amounted to $\frac{1}{16.901}$ of the whole. There was an excess of acid of about two grains. The weight of the whole was 1439 grains: the quantity of salt consequently was $\frac{1439}{16.901} = 85.142$ grains. The quantity of alkali was $50.05 - 14 = 36.05$. The quantity of standard acid employed was 66.7. The whole therefore amounted to 10275 grains; but as only 85.142 grains entered into the composition of the salt, the remaining 17.608 must have been pure water mixed with the nitric acid. But if 66.7 of standard acid contain 17.608 of water, 100 parts of the same acid must contain 26.38. One hundred parts of standard nitric acid, therefore, are composed of 73.62 parts of pure nitric acid and 26.38 of water.

Dr. Davy considers as pure acid the permanently elastic vapour or gass formed by saturating nitrous gass with oxygen gass. This gass is of a pale-yellow colour, and a specific gravity 2.44 times that of air. It is not pure acid, containing undoubtedly a portion of nitrous gass. The following table exhibits the proportion of this acid contained in nitric acid of different densities, according to the experiments of that ingenious chemist:

100 parts Nitric Acid, of sp. gr.	True Acid.	Water.
1.5040	91.55	8.45
1.4475	80.39	19.61
1.4285	71.56	28.35
1.3906	62.96	37.04
1.3551	56.88	43.12
1.3186	52.03	47.97
1.3042	49.04	50.96
1.2831	46.03	53.97
1.2090	45.27	54.73

When nitric acid is exposed to the action of heat it boils at the temperature of 248, and evaporates completely without alteration; but when made to pass through a red-hot porcelain tube it is decomposed, and converted into oxygen and azotic gass. When cooled down to —66 it begins to congeal; and when agitated it is converted into a mass of the consistence of butter.

Oxygen gass has no action whatever on nitric acid; but all the simple combustibles decompose it, unless we are to except the diamond. When poured upon sulphur or phosphorus at a high temperature it sets them on fire; but at a moderate temperature it converts them slowly into acids, while nitrous gass is exhaled. It inflames charcoal also at a high temperature; and even at the common temperature, provided the charcoal is perfectly dry and minutely divided. Hydrogen gass produces no change on it at the temperature of the atmosphere; but when passed along with it through a red-hot porcelain tube it detonates with great violence; water is formed, and azotic gass evolved.

When this acid is poured upon oils it sets them on fire. This is occasioned by a decomposition both of the acid and oil. The oxygen of the acid combines with the carbon hydrogen of the oils, and at the same time lets go a quantity of caloric. Hence we see that the oxygen which enters into the composition of the nitric acid still contains a great deal of caloric; a fact which is confirmed by a great number of other phenomena. The combustion of oils by this acid was first taken notice of by Borrichius and Slare; but it is probable that Homberg communicated it to Slare. In order to set fire to the fixed oils it must be mixed with some sulphuric acid; the reason of which seems to be, that these oils contain water, which must be previously removed. The sulphuric acid combines with this water, and allows the nitric acid, or rather the oil and nitric acid together, to act. The drying oils do not require any sulphuric acid: they have been boiled, and consequently deprived of all moisture.

Azote has no action on nitric acid; but muriatic acid decomposes it by combining with a portion of its oxygen nitrous gass and oxymuriatic gass being evolved.

It is capable of oxydizing all the metals, except gold, platinum, and titanium. It appears, from the experiments of Scheffer, Bergman, Sage, and Tillet, that nitric acid is capable of dissolving (and consequently of oyxdizing) a very minute quantity even of gold.

It even sets fire to zinc, bismuth, and tin, if it is poured on them in fusion, and to filings of iron if they are perfectly dry.

Nitric acid combines with alkalies, earths, and the oxydes of metals, and forms compounds, which are called nitrats.

The order of its affinities is as follows:

Barytes,	Magnesia,
Potass,	Ammonia,
Soda,	Glucina,
Strontian,	Alumina,
Lime,	Zirconia.

Nitric acid is one of the most important instruments of analysis which the chemist possesses; nor is it of inferior consequence when considered in a political or commercial view, as it forms one of the most essential ingredients of gunpowder. Its nature and composition accordingly have long occupied the attention of philosophers: and from their experiments it appears, that nitric acid is composed of azote and oxygen; consequently nitrous gass is also composed of the same ingredients. And as nitrous gass absorbs oxygen, even from common air, and forms with it nitric acid, it is evident that nitric acid contains more oxygen than nitrous gass. But it is exceedingly difficult to ascertain the exact proportions of the component parts of this acid. Lavoisier concluded, from his experiments on the decomposition of nitre by charcoal, that nitric acid is composed of one part of azote and four parts of oxygen. But Davy has shewn that this decomposition is more complicated than had been supposed; and that Lavoisier's experiments by no means warrant the conclusion which he drew from them. Cavendish, on the other hand, concluded, from his experiments, that the acid which he formed, by combining together azote and oxygen by means of electricity, is composed of one part of azote and 2.346 of oxygen. With this result the experiments of Dr. Davy correspond very nearly, calculating the constituent parts in the acid produced by the electric spark passed through them in a given proportion at 29.5 of azote and 70.5 of oxygen, or 1 part of the former to 2.39 of the latter.

The nitric acid is also employed for etching on copper; as a solvent of tin to form with that metal a mordant for some of the finest dyes; in metallurgy and assaying; in various chemical processes, one account of the facility with which it parts with oxygen and dissolves metals; in medicine as a tonic, and as a substitute for mercurial preparations in syphylis and affections of the liver; as also in the form of vapour to destroy contagion. For the purposes of the arts it is commonly used in a diluted state, and contaminated with the sulphuric and muriatic acids, by the name of aqua fortis.

Aqua fortis is generally prepared by mixing common nitre with an equal weight of sulphat of iron, and half its weight of the same sulphat calcined, and distillin. the mixture; or by mixing nitre with twice its weight of dry powdered clay, and distilling in a reverberatory furnace. Two kinds are found in the shops, one called double aqua fortis, which is about half the strength of nitric half acid; the other simply aqua fortis, which is the strength of the double.

A compound made by mixing two parts of the nitric acid with one of muriatic, known formerly by the name of aqua regia, and known by that of nitro-muriatic acid, has the property of dissolving gold and platina. On mixing the two acids, heat is given out, an effervescence takes place, oxygenated muriatic acid gass is evolved, and the mixture acquires an orange colour. This is like-

wise made by adding gradually to an ounce of powdered muriat of ammonia four ounces of double aqua fortis, and keeping the mixture in a sand heat till the salt is dissolved; taking care to avoid the fumes, as the vessel must be left open; or by distilling nitric acid with an equal weight or rather more of common salt. Nitric acid combines with alkalies, earths, and the oxyds of metals, and forms salts which are called nitrats. For which see the article NITRATS.

In different states of combination, azote and oxyen form also two different kinds of oxyds which are never found except in a gasseous form. These are denominated nitric oxyd gass, and nitrous oxyd gass. See the articles NITRIC OXYD, and NITROUS OXYD.

If a part of the oxygen contained in nitre or nitrat of potash be disengaged by exposure to a red heat, while no part of the azote flies off with it, the acid contained in the residual nitre will be of a different and a lower kind than that which the neutral salt possessed before it had parted with any of its oxygen. This acid is denominated NITROUS ACID, which see.

The salts formed by the union of nitrous acid with earths, alkalies, or metallic oxyds, are called NITRITES, and will be found noticed under that name.

It is necessary therefore to observe, in order to prevent confusion from the numerous compounds which issue from the nitrifying combination (if we may venture upon a new term, and which the occasion seems to demand) of azote and oxygen, that the nitric acid is usually obtained from its compound nitrat of potash, or common nitre; and that it afterwards gives birth to or is closely connected with five other distinct substances, deriving their names from the same radicle: nitric oxyd; nitrous oxyd; nitrous acid; nitrous vapour; and nitrites: which in conjunction with nitric acid, and nitrates, make the whole number of nitrified compounds seven. For the sake of reference, we have given each under its separate name.

NITRIC OXYD. NITROUS OXYD.—These substances are both gasseous combinations of the azote and oxygen which exist in common nitre, or nitrat of potash: and in order to avoid the error into which even chemists themselves have occasionally run, of confounding the different combinations of the two, we shall proceed to consider them in one and the same article, and by comparing them together point out their difference in a manner that cannot possibly be mistaken.

Both these oxyds have only been found to exist in a state of gass; and for a knowledge of both of them we are indebted to Dr. Priestley.

Nitrous oxyd gass was first traced by him about the year 1776, and received the name of dephlogisticated nitrous gass. The associated Dutch chemists examined it in 1793, and demonstrated it to be a compound of azote and oxygen: but for a full investigation of its properties we are indebted to Mr. now Dr. Davy, who published an excellent dissertation upon it in the year 1800; and from him it has derived the name of nitrous oxyd. It may be procured by the following process. Take any quantity of nitrat of ammonia (a salt composed of nitric acid and ammonia), in crystals, and expose it in a retort, by means of a lamp, to a heat not under 340° nor above 500°. It melts rapidly and is decomposed, emitting a great quantity of gass, which issues from the mouth of the retort, and may be received in glass jars in the usual manner. The gass which thus comes over is nitrous oxyd. This process was first pointed out by M. Bertholet; but it has been much simplified by Dr. Davy.

Nitrous oxyd gass thus obtained has all the mechanical properties of air; but it is much heavier than air. Its specific gravity, according to Davy, is 1.6003, that of air being 1.000. It is to common air nearly as 5 to 3. One hundred cubic inches of it at the temperature of 60°, barometer at 30 inches, weigh 49.706 grains. It is capable of supporting combustion even better than common air; almost as well as oxygen gass. A candle burns in it with a brilliant flame and a crackling noise. No combustible, however, burns in it unless it be previously brought to a state of ignition.

Dr. Priestley and the Dutch chemists concluded that it cannot be respired; but they did not examine it in a state of purity. Davy has ascertained that it may be breathed for several minutes without any bad effects. The feelings produced by breathing it bear a strong resemblance to intoxication; but they are not followed by that languor and debility which are constant attendants upon intoxication. It cannot, however, be breathed for longer than four minutes without the loss of voluntary motion altogether.

It is absorbed pretty rapidly by water, and acquires a sweetish taste: the whole of which is afterwards expelled unaltered by boiling the water.

It is not altered by exposure to light, or any heat below ignition: but when made to pass through a red-hot porcelain tube, or when electric sparks are made to traverse this gass, it is decomposed, and converted into nitric acid and common air.

There is no action between this gass and air, or oxygen gass. Sulphur at the common temperature is not altered by it. Phosphorus may be melted and sublimed in it without alteration. Charcoal, confined in it, may be kindled by means of a burning glass; and will continue to burn with great brilliancy till about half the gass is consumed. The products are carbonic acid gass and azotic gass.

With hydrogen gass it detonates violently, and emits a red flame, when a strong heat is applied, or when the electric spark is made to pass through the mixture.

Neither azote nor muriatic acid appear to have any marked action on this gasseous oxyd.

On some of the metals it acts with great energy at high temperatures. Thus iron wire burns in it with the same brilliancy as in oxygen gass, though the combustion lasts but a very short time. The iron is converted into a black oxyd; part of the nitrous oxyd is decomposed, its azote is evolved, and its oxygen combines with the iron.

It is capable of combining with alkalies, and forming salts of a very peculiar nature, for the discovery of which we are indebted to Dr. Davy. No combinations take place when the alkalies are exposed to nitrous oxyd in the gasseous state. But if it come into contact with them at the instant of its formation, it combines with them very readily. These compounds have been called azotites by Dr. Thomson.

From this general history of the properties of nitrous oxyd, it is obvious that it is a supporter of

combustion, and therefore that it contains oxygen in the same state as it exists in other supporters. That its other component part is azote cannot be doubted, if we consider that either azote or nitric acid is constantly evolved when nitrous oxyd is decomposed; and the experiments of Davy leave no doubt that these two substances are its only constituents: and they appear to be combined in the proportion of seven parts by weight of oxygen, and twelve of azote; or nearly

63 azote
37 oxygen

100

Much is still wanting to render the history of this singular substance complete. Dr. Davy has laid open a very interesting field of investigation, which promises to throw much light upon the nature of combustion; an operation more intimately connected with azote and its compounds than is supposed generally.

NITRIC OXYD. This was also formerly denominated nitrous gass, and was obtained accidentally by Dr. Hales: but for its nature and properties we are in the first instance altogether indebted to Dr. Priestley; although, from its being intimately connected in its phænomena with the most important investigations in chemistry, its character and powers have been still more deeply investigated since his time by the most eminent chemists of the day.

Nitric oxyd may be obtained by the following process: Put copper or mercury into a glass retort, and pour over it, somewhat diluted, nitric acid. The metal is rapidly dissolved with a strong effervescence, and a great quantity of gass issues from the mouth of the retort, which may be received in glass jars. This gass is nitrous gass.

When pure it is invisible, like common air, of which it possesses the mechanical properties. Its specific gravity is 1.094, that of air being 1.000, according to Davy.

Nitrous gass, then, is common air nearly as 34 to 31. One hundred cubic inches of it at the temperature of 60°, barometer 30 inches, weigh 33.923 grains.

Nitrous gass is exceedingly noxious to animals, producing instant suffocation whenever they attempt to breathe it. The greater number of combustible bodies refuse to burn in it. A taper, for instance, is extinguished the moment it is plunged into nitrous gass; the same thing happens to sulphur, even though previously burning with a white flame. It is capable, however, of supporting the combustion of several bodies, as has been ascertained by the experiments of Priestley and Davy. When Homberg's pyrophorus is introduced into nitrous gass, it takes fire spontaneously, just as it does in common air. Phosphorus too, when introduced into this gass in a state of inflammation, burns with as much splendour as in oxygen gass.

When nitrous gass and common air are mixed together, the mixture instantly assumes a yellow colour, heat is evolved, and the bulk of the two gasses diminishes considerably; slowly, if the experiment be made over mercury; but rapidly, if made over water.

When the diminution has reached its maximum, the mixture becomes perfectly transparent. The yellow colour is owing to a quantity of nitrous acid which is formed, and the diminution of bulk to the gradual absorption and condensation of this acid. What remains after this absorption is only azotic gass.

The cause of this remarkable phænomenon is obvious. The nitrous gass combines with the oxygen of the air, and forms nitrous acid, which is condensed; while the azote of the air remains behind in the form of a gass. Hence, with equal quantities of nitrous gass and air, the diminution of bulk is always proportional to the quantity of oxygen present in the air. Hence it informs us of the proportion of that substance in any particular air. The same phænomenon takes place when oxygen gass and nitrous gass are mixed; but the condensation is much more considerable. Indeed it would be complete, provided the two gasses were perfectly pure, and mixed in the proper proportions.

When electric sparks are made to pass through nitrous gass, it is decomposed and, converted into nitrous acid and azotic gass.

Nitrous gass is readily absorbed by water. From an experiment of Mr. Davy, it appears that 100 cubic inches of water at the common temperature, and previously freed from air, absorb 11.8 cubic inches of nitrous gass, or nearly one-tenth, as Dr. Priestley had ascertained; but the experiments of Mr. Henry do not accord with this estimate. Water, by his trials, at the temperature of 60°, absorbs only five per cent. of the bulk of this gass. This solution has no particular taste, and does not redden blue vegetable colours. The gass is expelled again by boiling the water; it separates likewise when the water is frozen.

Nitrous gass is decomposed by phosphorus and charcoal at a very high temperature, and probably also by sulphur. These substances are converted into acids by combining with the oxygen of the gass while its azote is evolved.

Hydrogen gass mixed with it acquires the property of burning with a green flame. A mixture of these two gasses does not take fire when electric sparks are made to pass through it; but according to Fourcroy, it detonates when made to pass through a red hot porcelain tube; water is formed, and azotic gass is evolved. Nitrous gass has no action whatever on azotic gass, even when assisted by heat: neither does act on muriatic acid. Several of the metals have the property of decomposing it, especially when assisted by heat; this is the case particularly with iron. Dr. Priestley confined a portion of nitrous gass for some time in contact with a number of iron nails; the gass was converted with oxyd of azote, in consequence, doubtless, of the iron abstracting part of its oxygen. It was in this manner that nitrous oxyd was discovered by that philosopher. When iron is heated to redness by means of a burning glass, the decomposition is complete, the whole of the oxygen is abstracted from the nitrous gass, and only azotic gass remains behind.

Dr. Priestley ascertained that nitrous gass is absorbed by the green sulphate of iron; a property which is employed successfully to ascertain its purity. All that is necessary is, to expose a given portion of nitrous gass in a close vessel to the action of green sulphate; the quantity of gass which remains unabsorbed gives the proportion of foreign bodies with which it is mixed. Mr. Davy has proved, that all the salts containing the black oxyd of iron possess the same property, and that they all absorb nitrous gass unaltered: the greatest

part of it may even be expelled again by the application of heat. Several other metallic salts possess the same properties. The following bodies have the property of converting nitric oxyd into nitrous oxyd.

Alkaline sulphites.
Hydroguretted sulphurets.
Muriate of tin.
Sulphuretted hydrogen gass.
Iron or zinc filings, moistened with water.

To produce this effect, nothing more is necessary than to put these substances into jars filled with nitric oxyd gass, and allow them to remain for a week or two. The substances gradually combine with a portion of oxygen, and are converted into oxyds or salts.

Nitrous gass is absorbed by alkaline solutions; but it does not appear from experiments hitherto made that it is capable, like oxyd of azote, of combining with alkalies and earths, and forming salts.

The conversion of nitric oxyd gass into nitric acid, by combining it with oxygen, is a demonstration that it contains azote as a constituent part; and the property which several bodies have of absorbing oxygen from it, and converting it into nitrous oxyd gass, is a demonstration that oxygen is the only other which it contains. But it is by no means easy to ascertain the proportion of these two constituents.

Mr. Lavoisier, from a set of experiments made at an early period, and in a manner not susceptible of much accuracy, estimated their proportions at about 68 oxygen, and 32 azote.

But this estimate is irreconcileable with the experiments of other philosophers. The proportions obtained by Mr. Davy deserve much more confidence, as his method was susceptible of greater accuracy.

By means of a burning-glass he exposed to the action of the sun's rays a small portion of prepared charcoal, placed in a measured quantity of nitric oxyd gass standing over mercury. The weight of charcoal did not exceed a quarter of a grain, and the gass amounted to 16 very small measures. After the process was finished, the bulk of the gass was increased about [illegible]ths of a measure. The whole of the nitric oxyd was decomposed. Potash ley rapidly absorbed the whole of the gass except eight measures, which were pure azote. But the gass originally was found by experiment to contain 0.6 of a measure of azote. Therefore, 15.4 measures of nitric oxyd, when decomposed by charcoal, are converted into 16.15 measures; 7.4 of which are azote, and 8.75 carbonic acid. But 15.4 measures of nitric oxyd weigh 5.2 grains, and 7.4 measures of azote weigh 22 grains.

Hence it follows, that 5.2 grains of nitric oxyd contain 2.2 of azote, the remaining three grains must be oxygen. This gives us nitric oxyd, composed of 2.2 azote and oxygen, or of 57.7 oxygen and 42.3 azote. The carbonic acid produced weighed 4.1 grains, and contained 1.15 grains of charcoal, combined with 2.95 grains of oxygen, which it had absorbed from the nitric oxyd. This gives us 5.2 grains of nitric oxyd, composed of 2.95 oxygen, and 2.25 azote: or 100 parts, containing 57 oxygen, and 43 azote, which differ very little from the preceding estimate. We may consider these last numbers as the nearest approximation to the composition of nitric oxyd.

The proportion of oxygen contained in the compounds of azote, according to these results, may therefore be stated thus:

Azote.	Oxygen.	
100	58.7	Nitrous oxyd.
100	136	Nitric oxyd.
100	236	Nitric acid.

Hence it follows, that

Azote.	Oxygen.	Nitrous oxyd.	Oxygen.	Nitric oxyd.	Oxygen.	Nitric acid.
100 +	058 =	158				
		158 +	0.78 =	2.36		
				2.36 +	100 =	336

See further the article NITRIC ACID, and especially its concluding paragraph.

NITRITES, in chemistry, salts produced from nitrats saturated with nitrous gass, or exposed to heat, and hence lowered in their proportion of oxygen. See NITRATS.

The existence of these salts was first pointed out by Bergman and Scheele: the two philosophers to whom we are indebted for the first precise notions concerning the difference between nitric and nitrous acids. They cannot be formed by combining directly nitrous acid with the different earthy and alkaline bases; nor have any experiments made to combine nitrous gass with the nitrats been attended with success.

The only method of obtaining these salts at present known is that which was long ago pointed out by Bergman and Scheele. It consists in exposing a nitrat to a pretty strong heat till a quantity of oxygen gass be disengaged from it. What remains in the retort after this process is a nitrite; but the length of time necessary for producing this change has not yet been ascertained with any degree of precision. If the heat be applied too long the nitrat will be totally decomposed, and nothing but the vase will remain, as happened to some of the French chemists on attempting to repeat the process of Bergman and Scheele.

Nitrite of potash is the only salt formed by this process of which an account has been given. Scheele's process for obtaining it is as follows: fill a small retort with nitre, and keep it red-hot for half an hour. When it is allowed to cool it is found in the state of a nitrite. It deliquesces when exposed to the air, and red vapours of nitrous acid are exhaled when any other acid is poured upon it.

As the nitrites have never been examined by chemists, and as it has not even been determined whether any considerable number of the nitrats can be converted into these salts, it would be in vain, in the present state of our knowledge, to attempt a particular description of them. It may, however, be considered as exceedingly probable that no such salts as the nitrites of ammonia, glucina, yttria, alumina, and zirconia, exist or can be formed, at least by the process of Scheele and Bergman: for the nitrats with these bases are decomposed completely by the action of a heat too moderate for the previous emission of oxgen gass.

From the few observations that have been made, it may be concluded that the nitrites are in general deliquescent, very soluble in water, decomposable by heat, as well as nitrats; that their taste is cooling, like that of the nitrats, but more acrid and nitrous: that by exposure to the air they are gradually converted into nitrats, by absorbing

oxygen: a change, however, that must take place exceedingly slowly.

Mr Tennant has shown that the nitrite of potash has the property of precipitating gold from its solutions in the metallic state, the nitrous acid absorbing the oxygen of the oxyd. This curious fact explains why gold or platina, dissolved by fusion with nitre, is thrown down in the metallic state if the mass be dissolved in water, which Mr. Tennant has also ascertained to be the case.

See the article NITRIC ACID, and especially the concluding paragraph.

NITROUS ACID. When nitre (which is a compound, as we have on various occasions observed of nitric acid and potash) is exposed to a red heat, it yields a considerable quantity of oxygen gass almost in a state of purity. If the process be conducted with the proper precautions, and stopped in time, the nitre still retains the properties of a neutral salt. But the acid which it holds is obviously in a different state, since it has lost a considerable part of its oxygen. To this new state the term nitrous acid is applied. It is always in this state that the acid is found, which is obtained by distilling a mixture of sulphuric acid and nitre, for the purpose of procuring nitric acid by a subsequent process. The acid of commerce is always nitrous acid. The nitric and nitrous acids were first accurately distinguished by Scheele.

The nature of nitrous acid was first investigated by Dr. Priestley, who demonstrated, by very decisive experiments, that it is a compound of nitric acid and nitrous gass. This opinion was embraced, or rather it was first fully developed, by Morveau. But the theory of Lavoisier, which supposed the difference between nitric and nitrous acids to depend merely on the first containing a greater proportion of oxygen than the second, for some time drew the attention of chemists from the real nature of nitrous acid. Raymond published a dissertation in 1796, to demonstrate the truth of the theory of Priestley and Morveau; and the same thing has been done still more lately by Messrs. Thomson and Davy. At present it is allowed by every one that nitrous acid is merely nitric acid, more or less impregnated with nitrous gass.

This being the case, and nitric acid being capable of absorbing very different proportions of nitrous gass, it is evident that there must be a great variety of nitrous acids, differing from each other in the proportion of nitrous gass which they contain; unless we choose to confine the term nitrous acid to the compound formed by saturating nitric acid completely with nitrous gass.

When nitrous gass is placed in contact with nitric acid, the acid absorbs it slowly, and acquires first a pale-yellow colour, then a bright yellow. When a considerable portion more of nitrous gass is absorbed, the acid becomes dark orange, then olive, which increases in intensity with the gass absorbed; then it becomes of a bright green; and, lastly, when fully saturated, it becomes blue-green. Its volume and its volatility also increase with the quantity of gass absorbed; and when fully saturated it assumes the form of a dense vapour, of an exceedingly suffocating odour, and difficultly condensible by water. In this state of saturation it is distinguished by Dr. Priestley by the name of nitrous acid vapour. It is of a dark red colour, and passes through water partly without being absorbed. The quantity of nitrous gass absorbed by nitric acid is very great. Dr. Priestley found, that a quantity of acid, equal in bulk to four pennyweights of water, absorbed 130 ounce-measures of gass without being saturated. The component parts of nitrous acid, of different colours and densities, may be seen in the following table, drawn up by Dr. Davy, from experiments made by him on purpose, with much precision;

100 parts.	Sp. grav.	Component parts.		
		Nitric acid.	Water.	Nitrous gass.
Solid nitric acid	1.504	91.55	8.45	—
Yellow nitrous	1.502	90.5	8.3	2
Bright yellow	1.500	88.94	8.10	2.96
Dark orange	1.480	86.84	7.6	5.56
Light olive	1.479	86.00	7.55	6.45
Dark olive	1.478	85.4	7.5	7.1
Bright green	1.476	84.8	7.44	7.76
Blue green	1.475	84.6	7.4	8.00

The colour of nitrous acid depends, in some measure, also on the proportion of water which it contains. When to yellow nitrous acid concentrated a fourth part by weight of water is added, the colour is changed to a fine green; and when equal parts of water are added it becomes blue. Dr. Priestley observed, that water impregnated with this acid in the state of vapour became first blue, then green, and lastly yellow. A green nitrous acid became orange-coloured while hot, and retained a yellow tinge when cold. A blue acid became yellow on being heated in a tube hermetically sealed. An orange-coloured acid, by long keeping, became green, and afterwards of a deep blue; and when exposed to air resumed its original colour. When nitrous acid is exposed to heat, the nitrous gass is expelled, and nitric acid remains behind. The gass, however, carries along with it a quantity of acid, especially if the acid be concentrated. See NITROUS VAPOUR; and especially the article NITRIC ACID in its concluding paragraph.

NITRO-MURIATIC ACID. Aqua regia. Konigwasser, *German*. In chemistry, a very powerful and important agent in a variety of operations; and particularly employed as a solvent for gold, whence indeed its old and alchemical name of aqua regia, gold being the royal metal of the alchemists; nor are there many other substances by which this noble metal can be dissolved.

Aqua regia for this purpose is prepared by adding to two parts of strong aqua-fortis (nitric acid) one of fuming muriatic acid, or one-half part of common salt, or muriat of ammonia. The most economical, however, and upon the whole best way of dissolving gold in this acid, is to put the granulated metal together, with six times its weight of nitric acid, into a tubulated glass retort, with a receiver annexed: the contents of the retort being warmed by a lamp, or a pot of charcoal, a little strong muriatic acid is to be poured in: an effervescence and copious extrication of nitrous gass will take place, and the gold will begin to be in action; as soon as the gass ceases to be produced, a fresh quantity of muriatic acid is to be added, and so on till the gold is dissolved.

Nitro-muriatic acid, however, is, generally speaking, a term not meant to designate any particular acid, but simply a mixture of nitric or nitrous and muriatic acid, or sometimes muriat of ammonia.

Dr. Priestley found that a very powerful aqua regia, which dissolves gold with great rapidity, may be formed by impregnating liquid muriatic acid with nitrous vapour. The proportion of constituent

parts here widely differs from those of the common aqua regia for gold. He also tried to form a nitro-muriatic acid that would dissolve gold, by impregnating nitrous acid with muriatic acid gass, but without success, as the liquor would not touch this metal.

When nitro-muriatic acid is saturated with an alkali, the nitrous gass which it had absorbed is given out, and the liquor duly evaporated gives both a nitrat and muriat of the alkali used. But when the acid is saturated with a metal, the resulting salt is usually a simple muriat, the nitric acid having been employed to oxygenate the metal; and thus to render it, in most instances, soluble in the muriatic acid, to which most metallic oxyds have the strongest affinity.

Nitrous vapour. This is another form in which the acid obtained from nitre exists, and requires particular notice. The present name was given to it by Dr. Priestley; and the substance itself is nitrous acid in the form of red vapour, consisting of nitrous gass holding nitric acid in solution.

It is produced in various ways. For example: if to nitrous gass be added oxygen gass, a red cloud is formed, which, if the gasses be confined over water, is readily absorbed; but if no water be present, remains as a permanent gass, which gass is nitrous vapour. Thus too it is expelled from the fuming nitrous acid by heat; and is produced during the solution of bismuth and some other of the metals in nitric acid, when the action is very violent; the nitrous gass always generated in such solutions dissolving and carrying up a portion of the acid. Nitrous gass therefore, when in large quantity, has a strong tendency to volatilize the acid, and this is more powerful in proportion to its concentration, or inversely, as the water it contains. The proportions of nitrous gass and nitric acid in nitrous vapour vary considerably.

The action of heat on nitric acid, therefore, appears to be the following: Supposing the acid to contain no separable portion of nitrous gass, or oxyd, in solution, the heat appears first to decompose part of the acid into nitrous oxyd and oxygen, and these being expelled as soon as formed, carry up in solution a certain portion of undecompounded acid, and the three together form nitrous vapour. The oxygen, however, does not seem to be an essential constituent of the vapour, and perhaps is only mechanically mixed with it. If the acid is closely confined in a vessel which it does not fill, the vapour remains unchanged in the empty space above the acid, and when the heat is withdrawn, a portion of it, more or less, according to the density and elasticity, is again absorbed by the acid, and renders it coloured. A part, at least, of the oxygen gass remains in the gasseous state unaltered; but it is by no means improbable, that as soon as the heat is removed another part of the oxygen may again combine with the nitrous gass which it had quitted, and return into the body of the acid.

The composition, therefore, nitrous vapour is various: and it may exist with an excess either of oxygen or of azot, according to the way in which it is procured: and by this Berthollet explains several apparent contradictions in its phænomena.

The analysis of nitrous vapour is extremely difficult, owing to the impossibility of confining it unaltered in jars by any known fluid, as it acts powerfully on almost every fluid in nature.

Dr. Priestley made many attempts to procure it in quantities, and tolerably uniform in its composition. He found it produced readily by the rapid solution of bismuth in nitric acid; but the method on the whole most convenient was to dissolve lead in dilute nitric acid, and evaporate the solution to complete dryness. This left a white nitrat of lead, which, when put into a small glass tube or retort, and heated strongly, gave a large quantity of red nitrous vapour in considerable purity. This species of nitrous vapour, however, seems to differ from that produced by the supersaturation of nitrous gass with oxygen confined by mercury, and from that produced by heat from nitric acid; for the vapour from the nitrat of lead absorbs oxygen from the air in the same way as common nitrous gass, only not so rapidly. It is with this nitrous vapour that Dr. Priestley made many experiments in its absorption by different bodies, some of which are as follows:

Water impregnated with this vapour was increased one-third in bulk, and in this state, when left at rest, was constantly again exhaling the vapour with great force, so that it could with difficulty be kept in close-stopped phials. The colour was bluish-green. On pouring a little into a glass, and blowing away from the surface the red vapour issuing out, the colour of the liquor gradually changed to pale yellow, like common nitrous acid, and it was in every respect similar to this acid. The acid made in this way is also purer than the common spirit of nitre, as it contains no admixture of muriatic acid.

Oils absorb this vapour readily, and in general are stiffened and coagulated. See the article Oil.

Sulphuric acid absorbs nitrous vapour. On pouring a little of the acid into a phial full of the vapour and shaking it for a time, the red colour of the air disappeared, and a vacuum was formed above the acid, which last became of a light blue colour, exhaling a white vapour. On putting some of this acid into a glass, and gently pouring water on it, no change was observed at first; but on stirring the mixture great heat was excited, and a vast quantity of red vapour was expelled with vehemence. The acid after this seemed to have lost all that it had before absorbed, and to be merely sulphuric acid diluted with water. When concentrated acid is fully saturated with nitrous vapour, and suffered to remain at rest for a time, it crystallizes.

The muriatic acid also absorbs the nitrous vapour, and then assumes a deep orange colour without much increase of bulk, and is converted into a very powerful aqua regia, or Nitro-muriatic acid, which see.

Nitrous. (*nitreux*, Fr.) Impregnated with nitre.

NITRUM. Nitre. Saltpetre. In mineralogy, a genus of the class salts. Of a sharp, bitterish, cooling taste; easily soluble in water, and the solution not made turbid by a mixture of soda; not effervescing with diluted acids, but when saturated with concentric sulphuric acid, emitting sharp suffocating red vapours; detonates violently when made red hot and charcoal is thrown upon it. Four species.

1. N. nativum. Nitre; saltpetre; nitrat of potash. Fixed, pure, not deliquescing in the air; when dissolved and slowly evaporated, crystallizing into six-sided prisms, terminated at each end by an unequal six-sided pyramid. Found in Virginia, Spain, Sicily, India, Persia, and China; white, of a cooling taste, and resisting putrefaction; very brittle, and soluble in seven times its weight of water; when exposed to a strong heat it melts, and congeals by cooling into an opaque

mass, detonates very violently with combustible bodies, particularly with phosphorus. Its principal use is in the composition of gun-powder; which is made by mixing together 76 parts of nitre, 15 of charcoal, and 9 of sulphur. These ingredients are first reduced to a fine powder, mixed well together, and incorporated into a thick paste with water; after being a little dried it is forced through a sieve with small holes, and thus formed into grains: these grains, when properly dried, are put into barrels which turn on their axes, by which means the asperities are worn off, and the surfaces made smooth. Specific gravity 1,9369: contains

Acid	31
Potash	61
Water	8
	100 *Bergman.*

2. N. humosum. Mineralized nitre: humid nitre fixed, not deliquescing in the air; when dissolved and slowly evaporated, crystallizing into six-sided prisms, terminating at each end in a six-sided unequal pyramid, efflorescing mixed with mould or chalk. Found generally in a state of white efflorescence in moist old walls, which are but little exposed to the action of the sun and winds, as in wells, grottos, &c. especially those which face towards the sea.

3. N. cubicum. Fixed, when dissolved and evaporated, concreting into rhombic crystals. Found, though rarely, in caves with the last, efflorescing from the moist sides of walls.

4. N. flammans. Semivolatile nitre. Evaporating in smoke when thrown on red hot coals, emitting an alkaline odour when rubbed together with N. humosum. See Nitric acid.

NI'TRY. *a.* (from *nitre.*) Nitrous (*Gay*).

NI'TTILY. *ad.* (from *nitty.*) Lousily (*Hay.*).

NI'TTY. *a.* (from *nit.*) Abounding with the eggs of lice.

NI'VAL. *a.* (*nivalis*, Latin.) Abounding with snow.

NI'VEOUS. *a.* (*niveus*, Latin.) Snowy (*Brown*).

NIVELLE, a town of Brabant, remarkable for its abbey of noble canonesses, whose abbess is styled princess of Nivelle. Here also is John of Nivelle, so much admired by the common people; which is the figure of a man in iron, standing on the top of a tower near the clock, who strikes the hours with a hammer. The place enjoys great privileges, and has a manufacture of cambrics. It is 15 miles S.E. of Brussels. Lon. 4. 36 E. Lat. 50. 35 N.

Nivelle de la Chaussée (Peter Claude), a French poet, born at Paris 1692. He preferred literature to all other distinctions, and acquired some celebrity by his epistle to Clio, and his dramatic pieces. He died at Paris, 1754. His pieces possess merit, and are much esteemed in France. The best are, The School of Mothers; Melanides la Gouvernante; comedies: Maximian; George Barnwell, &c. tragedies.

NIVERNOIS, a late province of France, between Burgundy, Bourbonnois, and Berry. It is pretty fertile, contains mines of iron, and is watered by a great number of rivers, of which the Loire, Allier, and Yonne, are the principal. It now forms the department of Nievre.

Nivernois (Lewis Julius Mancini duke of), minister of state, well known as a poet, and a writer, was born at Paris, 1716. He left the military profession, and as ambassador represented his sovereign at Rome, at Berlin, and afterwards in London, where he negociated the peace of 1763. On his return to Paris he withdrew from political life, and devoted himself to the muses. His poetical imitations of Virgil, Horace, Ovid, Tibullus, Ariosto, and Milton, possess great merit and singular beauty, and his songs and fables were popular productions. During the revolution he had the good fortune to escape, and he died at Paris, 1798, at the great age of 82. His other works are, Dialogues of the Dead; Letters on the Use of the Mind; Reflections on the Genius of Horace, of Boileau, of J. P. Rousseau; the Life of the Abbe Barthelemi; Reflections on Alexander the Great, and Charles XII.; translation of Tacitus's Life of Agricola; Pope's Essay on Man, translated; Portrait of Frederic the Great of Prussia, &c.

NIXABOUR, a town of Persia, in Chorasan, 80 miles S.E. of Mesched. Lon. 61. 32 E. Lat. 35. 40 N.

NIXAPA, a considerable town of New Spain, with a rich Dominican convent. The country near it produces a great deal of indigo, cochineal, and sugar. It is 50 miles S.E. of Antequiera. Lon. 97. 15 W. Lat. 16. 42 N.

NIZAMPATAM, a town of the peninsula of Hindustan, situate at the mouth of the Kistnah, 34 miles S.W. of Masulipatam. Lon. 80. 50 E. Lat. 15. 55 N.

NIZNEI NOVOGOROD, a town of Russia, in a government of the same name, with a citadel, and an archiepiscopal see. It is seated on a mountain, at the confluence of the Volga and the Occa, 220 miles E. by N. of Moscow. Lon. 46. 30 E. Lat. 56. 34 N.

NI'ZY. *s.* A dunce; a simpleton.

NO. *ad.* (na, Saxon.) 1. The word of refusal (*Calamy*). 2. The word of denial (*Bacon*). 3. It sometimes strengthens a following negative: *no not*, not even (*Waller*).

No. *a.* 1. Not any; none (*Swift*). 2. *No one:* none; not any one (*Smalridge*).

NOAH, the son of Lamech, born 2948 B.C. The Almighty being resolved to punish the wickedness of the earth, commanded Noah to build an ark for himself and his family, which being completed, a deluge of waters overwhelmed the globe, and all perished, except those who were in the ark. Seven months after the commencement of the flood, the ark rested on Mount Ararat; and Noah having landed, offered a sacrifice unto the Lord, who made a covenant with him, that the earth should no more suffer in that manner. After this Noah cultivated the land and planted the vine. Having drunk freely of the juice of the grape one day, he lay in an indecent posture, and was discovered by his son Ham, who exposed him to his brothers, Shem and Japhet; but they taking a mantle, covered their father therewith. Noah being informed of this, pronounced, in the spirit of prophecy, a curse

upon Ham and his posterity. Noah died 1998 B.C.

St. Peter calls Noah a preacher of righteousness (2 Peter ii. 5.), because before the deluge he was incessantly preaching and declaring to men, not only by his discourses, but by his unblameable life, and by the building of the ark, in which he was employed six score years, that the wrath of God was ready to pour upon them. But his preaching had no effect, since, when the deluge came, it found mankind plunged in their former enormities. (Mat. xxiv. 37.)

Several learned men have observed, that the heathen confounded Saturn, Deucalion, Ogyges, the god Cœlus or Ouranus, Janus, Protheus, Prometheus, &c. with Noah. The wife of Noah is called Noriah by the Gnostics; and the fable of Deucalion and his wife Pyrrha is manifestly invented from the history of Noah.

NOAH'S ARK. See ARK.

NOAH'S ARK, in helminthology. See ARCA.

NOAILLES (Lewis Antony de), cardinal and archbishop of Paris, a prelate of great piety, was the second son of the duke of Noailles, and born in 1651. His serious disposition led him to take orders, and in 1680 he obtained the bishopric of Chalons; from whence he was translated to Paris in 1695. He laboured in reforming the abuses of his diocese, and opposed the errors of the quietists with zeal mixed with charity. He also opposed the jansenists, and published an ordinance against them. However he refused to accept the bull Unigenitus, unless it should be so explained as not to infringe on the liberties of the Gallican church. He died in 1729.

To NOBI'LITATE. *v. a.* (*nobilito*, Latin.) To ennoble; to make noble.

NOBI'LITY. *s.* (*nobilitas*, Latin.) 1. Antiquity of family joined with splendour (*Dryden*). 2. Rank or dignity of several degrees, conferred by sovereigns. *Nobility* in England is extended to five ranks; duke, marquis, earl, viscount, baron. 3. The persons of high rank (*Shakspeare*). 4. Dignity; grandeur; greatness (*Sidney*).

NO'BLE. *a.* (*noble*, Fr. *nobilis*, Lat.) 1. Of an ancient and splendid family. 2. Exalted to a rank above commonalty (*Dryden*). 3. Great; worthy; illustrious (*Milton*). 4. Exalted; elevated; sublime (*Dryden*). 5. Magnificent; stately. 6. Free; generous; liberal. 7. Principal; capital: as, *the heart is one of the* noble *parts of the body*.

NO'BLE. *s.* 1. One of high rank (*Bacon*). 2. A coin rated at six shillings and eight pence (*Bacon*).

NOBLE (Eustache de), a native of Troyes, procureur general of the parliament of Metz. An accusation of being guilty of mal-practices all at once robbed him of his office, and after being imprisoned in the Chatelet, he was banished for nine years. He appealed against this sentence, and was removed to the Conciergerie, where he became acquainted with Gabridle Perreau, generally called la belle epiciere, a woman of great beauty, and many mental accomplishments. He escaped from his confinement, and was followed by his frail but faithful mistress, by whom he had three children, and at last he finished a life of adventures, wretchedness, and poverty, 1711, aged 68. He wrote several things divided into serious pieces, poetry, and romances, collected together in 19 vols. 12mo. The best known of these are the History of the Dutch Republic, 2 vols; Account of Genoa; Dissertation on the Year of Christ's Nativity; Secret History of the Conspiracy of the Piazzi against the Medicis; Tales and Fables, &c.

NOBLE LIVERWORT. See HEPATICA.

NO'BLEMAN. *s.* (*noble* and *man.*) One who is ennobled (*Dryden*).

NO'BLENESS. *s.* (from *noble.*) 1. Greatness; worth; dignity; magnanimity (*Shakspeare. Taylor*). 2. Splendour of descent; lustre of pedigree.

NOBLE'SS. *s.* (*noblesse*, Fr.) Not used. 1. Nobility (*Spenser*). 2. Dignity; greatness (*Ben Jonson*). 3. Noblemen collectively (*Shakspeare*).

NO'BLY. *ad.* (from *noble.*) 1. Of ancient and splendid extraction (*Dryden*). 2. Greatly; illustriously (*Shakspeare.*) 3. Grandly; splendidly (*Addison*)

NO'BODY. *s.* (*no* and *body.*) No one; not any one (*Clarendon*).

NO'CENT. *a.* (*nocens*, Latin.) 1. Guilty; criminal (*Bacon*). 2. Hurtful; mischievous.

NOCERA, an ancient town of Italy, in the duchy of Spoletto, with a bishop's see; seated at the foot of the Apennines, 18 miles N.E. of Spoletto. Lon. 12. 49 E. Lat. 43. 1 N.

NOCERA-DI-PAGANI, a town of Naples, in Terra di Lavoro, 15 miles S. of Naples. Lon. 14. 20 E. Lat. 40. 36 N.

NOCK. *s.* (*nocchia*, Italian.) 1. A slit; a nick; a notch. 2. The fundament (*Hudib.*).

To NOCK. *v. a.* To place upon the notch.

NOCTAMBULATION. Walking in the night when asleep. See ONEIRODYNIA.

NOCTA'MBULO. *s.* (*nox* and *ambulo*, Lat.) One who walks in his sleep (*Arbuth.*).

NOCTI'DIAL. *a.* (*noctis* and *dies*, Latin.) Comprising a night and a day (*Holder*).

NOCTI'FEROUS. *a.* (*nox* and *fero*, Lat.) Bringing night.

NOCTILUCA, a species of phosphorus, so called because it shines in the dark without any light being thrown upon it: such is the phosphorus made of urine.

NOCTI'VAGANT. *a.* (*noctivagus*, Lat.) Wandering in the night.

NOCTUA, in the entomology of Fabricius, a tribe of the genus PHALÆNA; which see.

NO'CTUARY. *s.* (from *noctis*, Latin.) An account of what passed by night (*Addison*).

For a description of a mechanical contrivance, called the *watchman's noctuary*, by which it may be ascertained whether a watchman goes his rounds regularly, see Gregory's Mechanics, vol. ii, p. 480.

NO'CTURN. *s.* (*nocturnus*, Lat.) An office of devotion performed in the night (*Stilling.*).

NOCTU'RNAL. *a.* (*nocturnus*, Latin.) Nightly (*Dryden*).

NOCTURNAL, NOCTURLABIUM, an instrument chiefly used at sea, to take the altitude or depression of some stars about the pole, in order to find the latitude and hour of the night.

Some nocturnals are hemispheres, or planispheres, on the plane of the equinoctial. Those commonly in use among seamen are two; the one adapted to the poler star, and the first of the guards of the little bear; the other to the pole-star, and the pointers of the great bear.

This instrument consists of two circular plates applied to each other. The greater, which has a handle to hold the instrument, is about two inches and a half in diameter, and is divided into twelve parts, agreeing to the twelve months, and each month subdivided into every fifth day; and so that the middle of the handle corresponds to that day of the year wherein the star here regarded has the same right ascension with the sun. If the instrument is fitted for two stars, the handle is m de /eable. The upper left circle is divided into twenty-four equal parts of the twenty-four hours of the day, and each hour subdivided into quarters. These twenty-four hours are noted by twenty-four teeth to be told in the night. Those at the hours 12 are distinguished by their length. In the centre of the two circular plates is adjusted a long index, moveable upon the upper plate; and the three pieces, viz. the two circles and index, are joined by a rivet, which is pierced through the centre with a hole, through which the star is to be observed.

To use the nocturnal.—Turn the upper plate till the long tooth marked 12 is against the day of the month on the under plate: then, bringing the instrument near the eye, suspend it by the handle with the plane nearly parallel to the equinoctial; and viewing the pole-star through the hole of the centre, turn the index about till, by the edge coming from the centre, you see the bright star or guard of the little bear (if the instrument is fitted to that star): then that tooth of the upper circle under the edge of the index is at the hour of the night on the edge of the hour-circle: which may be known without a light, by counting the teeth from the longest, which is for the hour 12.

To NOD. *v. a.* (of uncertain derivation). 1. To decline the head with a quick motion (*Shakspeare*). 2. To pay a slight bow (*Shakspeare*). 3. To bend downward with quick motion (*Dryden*). 4. To be drowsy (*Add.*).

NOD. *s.* (from the verb.) 1. A quick declination of the head (*Locke*). 2. A quick declination (*Shakspeare*). 3. The motion of the head in drowsiness. 4. A slight obeisance (*Shakspeare*).

NODATED HYPERBOLA, a name given by sir Isaac Newton to a kind of hyperbola, which, by turning round, decussates or crosses itself.

NODATION. *s.* (from *nodo*, Latin.) The act of making knots.

NO'DDER. *s.* (from *nod.*) One who makes nods (*Pope*).

NODDING. (*nutans.*) In botany, when applied to a stem, it is explained to mean, bent down outward from the top. When applied to a flower, it signifies that the peduncle is considerably curved, but not so much as in the flos cernuus; which, as the term implies, points directly to the ground.

NODDING CNICUS. The systematic name of this plant is cnicus cernuus. In Siberia the tender stalks are first peeled and then boiled and eaten by the inhabitants.

NO'DDLE. *s.* (hnol, Saxon.) A head, in contempt (*Ben Jonson*).

NO'DDY. *s.* (from *naudin*, French) A simpleton; an idiot (*L'Estrange*).

NODDY, in ornithology. See STERNA.

NODE. *s.* (*nodus*, Latin.) 1. A knot; a knob. 2. A swelling on the bone (*Wiseman*). 3. Intersection (*Holder*).

NODES, in astronomy, the two opposite points where the orbit of a planet intersects the ecliptic. That where the planet ascends from the south to the north side of the ecliptic is called the ascending node, or the dragon's head, and marked thus ☊: and the opposite point, where the planet descends from the north to the south side of the ecliptic, is called the descending node, or dragon's tail, and is thus marked ☋. Also the right line drawn from the one node to the other is called the line of the nodes.

By observation it appears that, in all the planets, the line of the nodes continually changes its place, its motion being *in antecedentia*; i. e. contrary to the order of the signs, or from east to west; with a peculiar degree of motion for each planet. Thus, by a retrograde motion, the line of the moon's nodes completes its circuit in 18 years and 225 days, in which time the node returns again to the same point of the ecliptic. Newton had not only shewn that this motion arises from the action of the sun, but, from its cause, he has with great skill calculated all the elements and varieties in this motion. See his Princip. lib. 3. prop. 30, 31, &c.

The moon must be in or near one of the nodes when there is an eclipse, either of the sun or moon.

NODO'SITY. *s.* (from *nodosus*, Latin.) Complication; knot (*Brown*).

NO'DOUS. *a.* (*nodosus*, Latin.) Knotty; full of knots (*Brown*).

NO'DULE. *s.* (*nodulus*, Latin.) A small lump (*Woodward*).

NOELS. Certain canticles or songs of joy, formerly sung at Christmas in the country churches in France. The name is derived from the Latin word *natalis*, and alludes to the nativity.

NŒNIA, the name given by the ancients to their dirge or funeral song.

NOETIANS, in church-history, Christian heretics in the third century, followers of Noetius, a philosopher of Ephesus, who pretended that he was another Moses sent by

God, and that his brother was a new Aaron. In other respects his opinions were, that there was but one person in the Godhead; and that the Word and the Holy Spirit were but external denominations given to God in consequence of different operations: that, as Creator, he is called Father; as incarnate, Son; and as descending on the apostles, Holy Ghost.

NOGAROLA (Isotta), a lady of Verona, well acquainted with philosophy, theology, and the learned languages. In a dialogue on the question whether Adam was a greater sinner than Eve in eating the forbidden fruit, she ably defended the cause of the mother of mankind, against Louis Foscaro, who maintained a different opinion. She died 1468, aged 38. Not less than 566 of her letters were preserved in de Thou's library.

NOGAROLA (Lewis), a Venetian, well skilled in the Greek language. He translated into Latin various Greek authors, in a style elegant and correct. He died at Verona, 1559, age 50.

NO'GGEN. *a.* Hard; rough; harsh.

NO'GGIN. *s.* (*nessel*, German.) A small mug (*Arbuthnot*).

NOI'ANCE. *s.* (See ANNOIANCE.) Mischief; inconvenience (*Shakspeare*).

To NOIE. *v. n.* To annoy: not used (*Tusser*).

NOI'ER. *s.* (from *noie*.) One who annoys.

NOI'OUS. *a.* (*noioso*, Italian.) Hurtful; mischievous: obsolete (*Spenser*).

NOIRMOUTIER, a town of France, in the department of the Vendée, and chief place of a canton, in the district of Challans, with an harbour and bay on the east coast of the island of Noirmoutier, and defended with a fort, called Fort St. Pierre. Lon. 15. 24 E. Ferro. Lat. 47 N.

NOIRMOUTIER, an island, separated from the continent of France by a strait, of about a quarter of a league in width, three leagues long, and from a quarter to one league wide. Lon. 15. 20 to 15. 30 E. Ferro. Lat. 46. 53 to 47. 2 N.

NOIRMOUNT POINT, a cape at the entrance of St. Aubin's Bay, on the south coast of the island of Jersey.

NOISE. *s.* (*noise*, French.) 1. Any kind of sound (*Bacon*). 2. Outcry; clamour; boasting or importunate talk (*Baker*). 3. Occasion of talk (*Addison*).

To NOISE. *v. n.* (from the noun.) To sound loud (*Milton*).

To NOISE. *v. a.* To spread by rumour, or report (*Bentley*).

NOI'SEFUL. *a.* (*noise* and *full*.) Loud; clamorous (*Dryden*).

NOI'SELESS. *a.* (from *noise*). Silent; without sound (*Harte*).

NOI'SINESS. *s.* (from *noisy*.) Loudness of sound; importunity of clamour.

NOI'SEMAKER. *s* (*noise* and *maker*.) Clamour (*L'Estrange*).

NOI'SOME. *a.* (*noioso*, Italian.) 1. Noxious; mischievous; unwholesome (*Dryden*). 2. Offensive; disgusting (*Shakspeare*).

NOI'SOMELY. *ad.* (from *noisome*.) With a fetid stench; with an infectious steam.

NOI'SOMENESS. *s.* (from *noisome*.) Aptness to disgust; offensiveness (*South*).

NOI'SY. *a.* (from *noise*). 1. Sounding loud. 2. Clamorous; turbulent (*Smith*).

NOLDIUS (Christian), a Danish divine, divinity professor at Copenhagen, 1626. He travelled over Germany, Holland, and England, and was universally respected for his learning and virtues. He wrote Concordantia Particularum Hebræo-Chaldaicarum Veteris Testamenti, 4to.; Historia Idumæa; Sacrarum Historiarum et Antiquitatum Synopsis; Leges Distinguendi, &c. and died at Copenhagen, 1673, aged 47.

NOLANA, in botany, a genus of the class pentandria, order monogynia. Corol campanulate; style among the germs; nuts five, from two to four-celled, with a single seed in each. One species only: a native of Peru. It is an herbaceous trailing annual plant, with alternate branches, somewhat fleshy and papillous; plaited blue coral; and pale purple calyx. It is raised by sowing seeds in a hotbed in March, and will continue flowering from July till destroyed by the first winter frosts.

NOLI ME TANGERE, in botany. See IMPATIENS.

NOLI ME TANGERE. In medicine, a species of herpes that is very difficult to cure, is so termed by authors, because it is exasperated by most applications.

NOLI'TION. *s.* (*nolitio*, Latin.) Unwillingness: opposed to *volition* (*Hale*).

NOLLE PROSEQUI, is where a plaintiff in an action does not declare in a reasonable time; in which case it is usual for the defendant's attorney to enter a rule for the plaintiff to declare, after which a *non pros.* may be entered. A *nolle prosequi* is esteemed a voluntary confession, that the plaintiff has no cause of action; and therefore if a plaintiff enters his *nolle prosequi*, he shall be amerced: and if an informer cause the same to be entered, the defendant shall have costs.

NOLLET (John Anthony), in biography, a French ecclesiastic and celebrated natural philosopher in the eighteenth century, was born at Pimpré, in the diocese of Noyon, in the year 1700. His parents, who were persons of reputable character, though of humble fortunes, as they could not make him wealthy, determined to bestow on him the advantages of a good education. With this view they sent him to the college of Clermont in the Beauvoisin, and afterwards to Beauvais, where he laid a good foundation of grammar learning, which encouraged them to send him to Paris, in order to go through a course of philosophy at that university. It was their wish that he should embrace the ecclesiastical profession, and young Nollet adopted without repugnance the choice which they made for him. From a very early age he had shewn a taste for the study of natural philosophy, which had not yet become his ruling passion; he was, there-

fore, enabled to check himself in a pursuit which was likely to interfere with the studies more appropriate to his destined character, and gave himself up entirely to the study of scholastic theology. Having completed his academical course, and passed with reputation through the usual examinations, in 1728 he was admitted to deacon's orders, and soon became a licensed preacher. This new occupation, however, did not wholly divert his attention from the subjects of his early enquiries, and they insensibly claimed more and more of his time. At length his inclination for the sciences became irresistible, and he gave himself up to the study of natural philosophy with an ardour to which the kind of privation in which he had so long lived gave augmented force. It was now his good fortune to become known to M. du Fay and M. Reaumur, and under their instructions his talents were rapidly developed. By the former he was received as an associate in his electrical researches: and the latter resigned to him his laboratory. It was under these masters that he developed his talents. M. du Fay took him along with him in a journey he made into England; and Nollet profited so well of this opportunity, as to institute a friendly and literary correspondence with some of the most celebrated men in this country.

The king of Sardinia gave him an invitation to Turin, to perform a course of experimental philosophy to the duke of Savoy. From thence he travelled into Italy, where he collected some good observations concerning the natural history of the country.

In France he was master of philosophy and natural history to the royal family; and professor royal of experimental philosophy to the college of Navarre, and to the schools of artillery and engineers. The Academy of Sciences appointed him adjunct-mechanician in 1739, associate in 1742, and pensioner in 1757. Nollet died the 24th of April 1770, in the seventieth year of his age, regretted by the enlightened public, as well as the numerous friends whose attachment he had secured by the amiableness of his manners and the goodness of his heart; and more especially regretted by his poor relations, to whose relief and comfort he always paid the most affectionate attention. Besides the Royal Society of London, and the Royal Academy of Sciences at Paris, he was a member of the Institute of Bologna, the Academy of Sciences at Erfurt, and other philosophical societies and academies.

In addition to a multitude of papers inserted in the different volumes of the Memoirs of the Academy of Sciences, from the year 1740 to the year 1767, both inclusive, the Abbé Nollet was the author of Lessons on Experimental Philosophy, in six volumes, 12mo.; a Collection of Letters on Electricity, 1753, in three volumes, 12mo.; Enquiries into the particular Causes of Electric Phænomena, 12mo.; and the Art of making Philosophical Experiments, in three volumes, 12mo. From the articles just enumerated, as well as an anecdote already related in his life, it appears that Abbé Nollet paid particular attention to the study of electricity; and it must be acknowledged, notwithstanding the mistakes which he fell into upon the subject, that his indefatigable industry and curious experiments contributed materially to the improvement of that science. The theory of affluences and effluence of this philosopher, which gained considerable attention in his time, may be seen in Priestley's Electricity.

NOMADA, in the entomology of Fabricius, a tribe of the genus APIS; which see.

NOMÆ. (*nomæ arum*, Fr. from νεμω, to eat.) In medicine, ulcers that sometimes attack the cheeks or vulva of young girls. They appear in the form of red and somewhat livid spots; are not attended with pyrexia, pain, or tumour; and in a few days become gangrenous.

NO'MANCY. *s.* (*nomance*, Fr.) The art of divining the fates of persons by the letters that form their names.

NO-MAN'S-LAND, a space in midships, between the after-part of the belfry and the fore-part of a boat, when she is stowed upon the booms, as in a deep waisted vessel. These booms are laid upon the forecastle nearly to the quarter-deck, where their after-ends are usually sustained by a frame, called the gallows, which consists of two strong posts, about six feet high, with a cross-piece reaching from one to the other athwart ships, and serving to support the ends of those booms, masts, and yards, which lie in reserve to supply the place of others carried away, &c. The above-named space is used to contain any blocks, ropes, tackles, &c. which may be necessary on the forecastle, and probably derives the name of no-man's-land from its situation, as being neither on the starboard nor larboard side of the ship, nor on the waist nor forecastle; but being situated in the middle, partakes equally of all those places.

NOMBLES, the entrails of a deer.

NO'ME. (from νεμω, to feed.) A phagedenic ulcer. Also a species of ulcer whose discharge corrodes the flesh.

NOMES. (Greek.) Certain airs in the ancient music sung to Cybele, the mother of the gods, to Bacchus, to Pan, and other divinities. The name of nome was also given to every air, the composition of which was regulated by certain determined and inviolable rules. There were two-part nomes, which were sung in two modes: also nomes in three parts, sung in three modes, viz. the Doric, Phrygian, and Lydian.

NOMENCLA'TOR. *s.* (Latin; *nomenclateur*, Fr.) One who calls things or persons by their proper names (*Addison*).

NOMENCLA'TURE. *s.* (*nomenclature*, Fr. *nomenclatura*, Latin.) 1. The act of naming (*Bacon*). 2. Vocabulary; a dictionary (*Brown*).

NOMENCLATURE. In the sciences, the language of their peculiar and technical terms: which has generally been kept distinct from

the language of common life, sometimes perhaps from a wish to preserve an air of mystery, and maintain an exclusive knowledge in relation to the subject treated of; but often from far better motives. Thus, in medicine, we hereby avoid the indelicacy of common appellations, and to certain extent escape the various caprices of fashion. Independently of which the language of the day is seldom sufficiently full and appropriate for scientific purposes.

"The perfection of a science," observes a modern writer, who has expressly treated upon the subject of nomenclature, or technology, as it was denominated by Aristotle, "depends in no inconsiderable degree upon the perfection of its language, and the perfection of its language upon its simplicity and precision. A man may have clear ideas in himself, but to communicate them to his readers, his terms must be equally clear, and possess a definite meaning. The philosophy of the middle ages was a chaos of darkness and perplexity: and such it would perhaps have descended to the present day, had not lord Bacon, the grand luminary of the sixteenth century, given life and utility to the senseless mass by calling men from the jargon of words to the study of things; and had not Locke and Condillac, in the ensuing century, set the admirable example of prefixing a determinate meaning to the various equivocal words in common use, and scrupulously employing them in this single signification.

"In our own times every one finds the advantage which chemistry has derived from the universal adoption of the Lavoisierian nomenclature: and though natural history has not hitherto been benefited in an equal degree, it is only because its language has not been equally corrected, and that its terminology continues to a considerable extent imprecise and erroneous."

The improvements in the nomenclature of pharmacy have not kept pace even with those of natural history: nor have the late efforts of the royal colleges of the united kingdom been equal to what we might have expected. In many instances the adopted terms are altogether indeclinable, and in others horridly barbarous even where they are declinable, as especially in *pot-assa*, which might easily have been exchanged for *kalium* or *kalia*, or for *lixiva*, as it was actually written in one of the older editions of the Edinburgh dispensary. And for the same reason we should have preferred *trona*, as adopted by Dr. Black, to *natron*, or even to its substitute, *soda*. In several of the pharmacopœias the word *aquæ* is still applied to salts and earths in a liquid form, though they might just as well be called alcohols, or quicksilvers. These are strictly solutions, and a distinction is necessary between these and the distilled waters which are properly *aquæ*. The wines are also anomalies which should have been avoided They are properly infusions or solutions: and perhaps the obsolete term *elixir* might have been revived with advantage. In many cases the titles of the formulæ are descriptions: this is particularly so in the existing Edinburgh pharmacopœia: they only want the vehicle and the proportion to contain the whole method.

In anatomy the nomenclature is still more defective, and the synonyms, particularly of the muscles, consequently numerous. The terms superior and inferior, anterior and posterior, are fixed with little precision, and their meaning varies in different systems. Muscles are named from their shape and their action, or the occupations in which they are employed. Were the whole of the nomenclature introduced, much of minute and uninteresting description might be avoided. Vicq d'Azyr made some unsuccessful attempts to attain greater accuracy. Chaussier's improvements were more judicious, and in osteology they merit great though not unreserved commendation. The same principle, however, that of expressing by the terms the relations of proximity and connexion, does not succeed so well in the myology: and the nomenclature of Chaussier and his colleague Dumas, when applied to the muscles, exhibits an inelegant unharmonious combination of cacophonous sounds. In our own country, Mr. Barclay has made a similar attempt with more success, and we trust his technology will be gradually adopted.

Medicine, notwithstanding the efforts of Sauvages, Linnéus, and Cullen, appears to stand in need of still more correction in its nomenculture than even anatomy. "Its vocabulary," observes Mr. Good, "is to this hour a jumble of terms derived from almost every language and every system, whether dead or living, founded upon no common principle, and equally destitute of precision and simplicity. We have Hebrew and Arabic terms; Greek and Latin; French, Italian, Spanish, German, English, and even Indian, African, and American, often barbarously and illegitimately compounded, fanciful in their origin, cacophonous in pronunciation; and for want of a determinate signification, formed, as one would think, rather for the purpose of supplying the place of ideas than of communicating them. It is a confusion which has arisen from these political and geographical changes that have marked the history of medicine in its different epochs, in conjunction with that succession of theories, which, from the time of Hippocrates, has been perpetually unfolding to the world; almost every one of which, if characterised by nothing else, has at least taken care to mark its existence by a new coinage of words." Transact. of the Med. Soc. of London, vol. I.

NO'MINAL. *a.* (*nominalis*, Lat.) Referring to names rather than to things; titular (*Locke*).

NO'MINALLY. *ad.* By name; with regard to a name; titularly.

NOMINALS, or NOMINALISTS, a sect of school-philosophers, the disciples and followers of Occam, or Ocham, an English cordelier, in the 14th century. They were great dealers in words, whence they were vulgarly denominated Word-sellers; but had the denomination of

Nominalists, because, in opposition to the Realists, they maintained, that words, and not things, were the object of dialectics.

This sect had its first rise towards the end of the 11th century, and pretended to follow Porphyry and Aristotle; but it was not till Ocham's time that they bore the name. The chief of this sect, in the 11th century, was a person called John, who on account of his logical subtilty was called the sophist; and his principal disciples were Robert of Paris, Roscelin of Compiegne, and Arnoul of Laon.

The nominals, with the Stoics, admit the formal conceptions or ideas of things, as the subject and foundation of universality: but to this they add names, which represent and signify, after the same univocal manner, and without any distinction, a great variety of single things, alike in genus and species. Whence it is that they are called nominals; as pretending, that to become learned, it is not enough to have just ideas of things, but it is likewise required to know the proper names of the genera and species of things, and to be able to express these clearly and precisely, without confusion or ambiguity. For some ingenious and philosophical remarks on this hypothesis, see Professor Dugald Stewart's Elements of the Philosophy of the Human Mind, p. 170, &c.

To NO'MINATE. *v. a.* (*nomino*, Lat.) 1. To name; to mention by name (*Wotton*). 2. To entitle; to call (*Spenser*). 3. To set down; to appoint by name (*Shakspeare*).

NOMINA'TION. *s.* (from *nominate*.) 1. The act of mentioning by name (*Wotton*). 2. The power of appointing (*Clarendon*).

NOMINATIVE, in grammar, the first case of nouns which are declinable. The simple position or laying down of a noun, or name, is called the nominative case; yet it is not so properly a case as the matter or ground whence the other cases are to be formed, by the several changes and inflections given to this first termination. Its chief use is to be placed in discourse before all verbs, as the subject of the proposition or affirmation.

NOMION. The appellation given by the Greeks to a kind of love song.

NOMODICTAI. (Lat.) The appellation given by the ancient Romans to the umpires at their sacred games and musical contests.

NON, *ad.* (Lat.) Not. It is never used separately, but sometimes prefixed to words with a negative power.

NONA, a seaport of Dalmatia, and a bishop's see. It was once a splendid city, but is now a mean place, and its harbour not capable of receiving large vessels. It is almost surrounded by the sea, and is seven miles N. by W. of Zara.

NO'NAGE. *s.* (*non* and *age*.) Minority; time of life before legal maturity (*Hale*).

NONAGESIMAL, in astronomy, the 90th degree of the ecliptic, reckoned from the eastern term, or point. The altitude of the nonagesimal is equal to the angle of the east, and, if continued, passes through the poles of the ecliptic; whence the altitude of the nonagesimal at a given time, under a given elevation of the pole, is easily found. If the altitude of the nonagesimal be substracted from 90°, the remainder is the distance of the nonagesimal from the vertex.

NONAGON, in mathematics, a figure having nine sides and angles. In a regular nonagon, or that the sides and angles of which are equal, if each side be 1, its area will be 6.182 nearly $= \frac{4}{9}$ of the tangent of 70° in the radius 1.

NONCE. *s.* Purpose; intent; design: not now in use (*Cleaveland*).

NONCONFORMIST, one who does not conform to the established religion of a country. Thus in England presbyterians are nonconformists; in Scotland, episcopalians are nonconformists; in Canada, protestants of all descriptions are nonconformists.

According to Blackstone, nonconformists, in England, are of two sorts. First, such as absent themselves from divine worship in the established church through total irreligion, and attend the service of no other persuasion. These, by the stat. 1. Eliz. c. 2. 23. Eliz. c. 1. and 3. Jac. I. c. 4. forfeit one shilling to the poor every Lord's-day they so absent themselves, and 20l. to the king if they continue such default for a month together. And if they keep any inmate thus irreligiously disposed in their house, they forfeit 10l. per month.

The second species of nonconformists are those who in the eye of the law offend through a mistaken or perverse zeal, and unite in worship with other communities. These again may be subdivided into those who dissent from the established church, because they conceive there is something erroneous either in her doctrine or her discipline, or her rites and ceremonies, or in all these; and those who separate from the establishment because her own doctrines, though read in the desks, are seldom inculcated from the pulpits. Thus we have presbyterians, baptists, independents, socinians, and quakers, among what are called *ex animo* nonconformists, some of whom disapprove of all religious establishments, conceiving them utterly repugnant to the spirit of christianity; while others, and they we suppose much the greater part, as the methodists, many independents, and some of the baptists, go upon the principle of assenting where they can, and of dissenting where they are compelled so to do; still lamenting that the constitution of the church is such in their estimation as compels them to dissent at all.

Nonconformists in the English laws are divided into the two great classes of papists and protestant dissenters: both of which were supposed to be equally schismatics, in not communicating with the national church; with this difference, that the papists divided from it upon material, though erroneous, reasons; but many of the dissenters upon matters of indifference, or, in other words, for no reason at all. "Yet certainly (says sir William Blackstone) our ancestors were mistaken in their plans of compulsion and intolerance.' The sin of schism, as such, is by no means the object of temporal coercion and punishment.

If through weakness of intellect, through misdirected piety, through perverseness and acerbity of temper, or (which is often the case) through a prospect of secular advantage in herding with a party, men quarrel with the ecclesiastical establishment, the civil magistrate has nothing to do with it; unless their tenets and practice are such as threaten ruin or disturbance to the state. He is bound indeed to protect the established church: and if this can be better effected by admitting none but its genuine members to offices of trust and emolument, he is certainly at liberty so to do; the disposal of offices being matter of favour and discretion. But this point being once secured, all persecution for diversity of opinions, however ridiculous or absurd they may be, is contrary to every principle of sound policy and civil freedom. The names and subordination of the clergy, the posture of devotion, the materials and colour of the minister's garment, the joining in a known or unknown form of prayer, and other matters of the same kind, must be left to the option of every man's private judgment.

"With regard therefore to protestant dissenters, although the experience of their turbulent disposition in former times occasioned several disabilities and restrictions (which I shall not undertake to justify) to be laid upon them by abundance of statutes; yet at length the legislature, with a true spirit of magnanimity, extended that indulgence to these sectaries, which they themselves, when in power, had held to be countenancing schism, and denied to the church of England. The penalties are conditionally suspended by the statute 1 W. and M. st. 1. c. 18. "for exempting their majesties protestant subjects, dissenting from the church of England, from the penalties of certain laws," commonly called the toleration act; which declares, that neither the laws above-mentioned, nor the statutes 1 Eliz. c. 2. § 14. 3 Jac. I. c. 4. and 5. nor any other penal laws made against popish recusants (except the test-acts) shall extend to any dissenters, other than papists and such as deny the trinity: provided, 1. That they take the oaths of allegiance and supremacy (or make a similar affirmation, being quakers), and subscribe the declaration against popery. 2. That they repair to some congregation certified to and registered in the court of the bishop or archdeacon, or at the county-sessions. 3. That the doors of such meeting-house shall be unlocked, unbarred, and unbolted; in default of which, the persons meeting there are still liable to all the penalties of the former acts. Dissenting teachers, in order to be exempted from the penalties of the statutes 13 and 14 Car. II. c. 4. 17 Car. II. c. 2. and 22 Car. II. c. 1. are also to subscribe the articles of religion mentioned in the statute 13 Eliz. c. 12. (viz. those which only concern the confession of the true Christian faith, and the doctrine of the sacraments), with an express exception of those relating to the government and powers of the church, and to infant-baptism. And by statute 10 Ann. c. 2. this toleration is ratified and confirmed; and it is declared, that the said act shall at all times be inviolably observed for the exempting such protestant dissenters as are thereby intended from the pains and penalties therein mentioned. Thus, though the offence of non-conformity is by no means universally abrogated, it is suspended, and ceases to exist with regard to these protestant dissenters, during their compliance with the condition imposed by the act of toleration: and, under these conditions, all persons, who will approve themselves no papists or oppugners of the trinity, are left at full liberty to act as their consciences shall direct them in the matter of religious worship. And if any person shall wilfully, maliciously, or contemptuously disturb any congregation, assembled in any church or permitted meeting-house, or shall misuse any preacher or teacher there, he shall (by virtue of the same statute) be bound over to the sessions of the peace, and forfeit 20l. But by statute 5 Geo. I. c. 4. no mayor or principal magistrate must appear at any dissenting meeting with the ensigns of his office, on pain of disability to hold that or any other office; the legislature judging it a matter of propriety, that a mode of worship, set up in opposition to the national, when allowed to be exercised in peace, should be exercised also with decency, gratitude, and humility. Neither doth the act of toleration extend to enervate those clauses of the statutes 13 and 14 Car. II. c. 4. and 17 Car. II. c. 2. which prohibit (upon pain of fine and imprisonment) all persons from teaching school, unless they be licensed by the ordinary, and subscribe a declaration of conformity to the liturgy of the church, and reverently frequent divine service established by the laws of this kingdom.

"As to papists, what has been said of the protestant dissenters would hold equally strong for a general toleration of them; provided their separation was founded only upon difference of opinion in religion, and their principles did not also extend to a subversion of the civil government. If once they could be brought to renounce the supremacy of the pope, they might quietly enjoy their seven sacraments; their purgatory, and auricular confession; their worship of relics and images; nay, even their transubstantiation. But while they acknowledge a foreign power, superior to the sovereignty of the kingdom, they cannot complain that the laws of that kingdom will not treat them upon the footing of good subjects.

"The following are the laws that have been enacted against the papists; who may be divided into three classes; persons professing popery, popish recusants convict, and popish priests. 1. Persons professing the popish religion, besides the former penalties for not frequenting their parish-church, are disabled from taking any lands either by descent or purchase, after 18 years of age, until they renounce their errors; they must at the age of 21 register their estates before acquired, and all future conveyances and wills relating to them; they are incapable of presenting to an advowson, or granting to any other person any avoidance of the same; they may not keep or teach any school, under pain of perpetual imprisonment; and, if they willingly say or hear mass, they forfeit the one 200, the other 100 marks, and each shall suffer a year's imprisonment. Thus much for persons who from the misfortune of family-prejudices, or otherwise, have conceived an unhappy attachment to the Romish church from their infancy, and publicly profess its errors. But if any evil industry is used to rivet these errors upon them; if any person sends another abroad to be educated in the popish religion, or to reside in any religious house abroad for that purpose, or contributes to their maintenance when there; both the sender, the sent, and the contributor, are disabled to sue in law or equity, to be executor or administrator to any person, to take any legacy or deed of gift, and to bear any office in the realm;

and shall forfeit all their goods and chattels, and likewise all their real estate for life. And where these errors are also aggravated by apostacy or perversion; where a person is reconciled to the see of Rome, or procures others to be reconciled, the offence amounts to high-treason. 2. Popish recusants, convicted in a court of law of not attending the service of the church of England, are subject to the following disabilities, penalties, and forfeitures, over and above those before-mentioned. They are considered as persons excommunicated; they can hold no office or employment; they must not keep arms in their houses, but the same may be seized by the justices of the peace; they may not come within 10 miles of London, on pain of 100l.; they can bring no action at law or suit in equity; they are not permitted to travel above five miles from home, unless by licence, upon pain of forfeiting all their goods; and they may not come to court, under pain of 100l. No marriage or burial of such recusant, or baptism of his child, shall be had otherwise than by the ministers of the church of England, under other severe penalties. A married woman, when recusant, shall forfeit two-thirds of her dower or jointure, may not be executrix or administratrix to her husband, nor have any part of his goods; and during the coverture may be kept in prison, unless her husband redeems her, at the rate of 10l. a-month, or the third part of all his lands. And lastly, as a feme-convert recusant may be imprisoned, so all others must, within three months after conviction, either submit and renounce their error, or, if required so to do by four justices, must abjure and renounce the realm: and if they do not depart, or if they return without the king's licence, they shall be guilty of felony, and suffer death as felons without benefit of clergy. There is also an inferior species of recusancy, (refusing to make the declaration against popery enjoined by statute 30 Car. II. st. 2. when tendered by the proper magistrate; which, if the party resides within ten miles of London, makes him an abolute rescusant convict; or if at a greater distance, suspends him from having any seat in parliament, keeping arms in his house, or any horse above the value of 5l. 3. Popish priests are in a still more dangerous condition. By statute 11 and 12 W. III. c. 4. popish priests, or bishops, celebrating mass or exercising any part of their functions in England, except in the houses of ambassadors, are liable to perpetual imprisonment. And by the statue 27 Eliz. c. 2. any popish priest, born in the dominions of the crown of England, who shall come over hither from beyond sea (unless driven by stress of weather and tarrying only a reasonable time), or shall be in England three days without conforming and taking the oaths, is guilty of high treason: and all persons harbouring him are guilty of felony without the benefit of clergy.

"This is a short summary of the laws against the papists; of which the president Montesquieu observes, that they are so rigorous, though not professedly of the sanguinary kind, that they do all the hurt that can possibly be done in cold blood. But in answer to this, it may be observed (what foreigners who only judge from our statute-book are not fully apprized of), that these laws are seldom exerted to their utmost rigour: and indeed, if they were, it would be very difficult to excuse them. For they are rather to be accounted for from their history, and the urgency of the times which produced them, than to be approved (upon a cool review) as a standing system of law. The restless machinations of the Jesuits during the reign of Elizabeth, the turbulence and uneasiness of the papists under the new religious establishment, and the boldness of their hopes and wishes for the succession of the queen of Scots, obliged the parliament to counteract so dangerous a spirit by laws of a great, and then perhaps necessary, severity. The powder-treason, in the succeeding reign, struck a panic into James I. which operated in different ways: it occasioned the enacting of new laws against the papists; but deterred him from putting them in execution. The intrigues of queen Henrietta in the reign of Charles I. the prospect of a popish successor in that of Charles II. the assassination-plot in the reign of king William, and the avowed claim of a popish pretender to the crown in subsequent reigns, will account for the extension of these penalties at those several periods of our history." But now that all just fears of a pretender may be said to have vanished, and the power and influence of the pope has become feeble, ridiculous, and despicable, not only in Britain, but in almost every kingdom of Europe; and as in fact the British catholics solemnly disclaim the dangerous principles ascribed to them; the British legislature, giving way to that liberality of sentiment becoming protestants, have lately repealed the most rigorous of the above edicts, viz. The punishment of popish priests or jesuits who should be found to teach or officiate in the services of that church; which acts were felony in foreigners, and high treason in the natives of this kingdom:—The forfeitures of popish heirs, who had received their education abroad; and whose estates went to the next protestant heir.—The power given to the son, or other relation, being a protestant, to take possession of the father's or other relation's estate, during the life of the real proprietor:—And the debarring papists from the power of acquiring any legal property by purchase.—In proposing the repeal of these penalties, it was observed, That, besides that some of them had now ceased to be necessary, others were at all times a disgrace to humanity. The imprisonment of a popish priest for life, only for officiating in the services of his religion, was horrible in its nature: and although the mildness of government had hitherto softened the rigour of the law in practice, it was to be remembered that the Roman catholic priests constantly lay at the mercy of the basest and most abandoned of mankind—of common informers; for on the evidence of any of these wretches, the magisterial and judicial powers were of necessity bound to enforce all the shameful penalties of the act. Others of these penalties held out the most powerful temptations for the commission of acts of depravity, at the very thought of which our nature recoils with horror; they seemed calculated to loosen all the bands of society; to dissolve all civil, moral, and religious obligations and duties, to poison the sources of domestic felicity, and to annihilate every principle of honour. The encouragement given to children to lay their hands upon the estates of their parents, and the restriction which debars any man from the honest acquisition of property, need only to be mentioned to excite indignation in an enlightened age.

The subject of the nonconformity of protestant dissenters has exercised the pens of many able writers on both sides of the question. In opposition to the dissenters, or in favour of the establish-

ment, we may mention the names of White, Horsley, Paley, Hart, and Daubeny; and on the dissenting side, the names of Neal, Cornish, Delaune, Towgood, Robinson, Palmer, and Flower. With respect to these advocates, some are much more temperate than others, as may be expected in all controverted questions. Thus, on the side of the establishment, some satisfy themselves with proving that ours is a christian church, and, naturally enough, lament the increase of dissenters; while others go farther, and attempt to prove that all separation from the establishment is schism, and is therefore sinful: and on the other hand, some dissenters satisfy themselves with justifying their dissent from the establishment, because, for example, they think that some ceremonies imposed, or the various orders of ministers, or the received subjects of baptism, or the mode of administering baptism and the Lord's supper, or the laxity of discipline, are incompatible with the scriptural pattern,—while others go farther, and attempt to prove that every religious establishment is neither more nor less than a direct violation of some of the strongest injunctions of the great head of the church. For our own parts, we conceive that those who approach the extremes, on either side, are in error: we are friends to an establishment of religion, especially if it be unaccompanied by the principle of exclusion, and allow a free toleration to the profession of christianity under other forms and modes: but we would not have men deprived of any of their rights as citizens and subjects, because they refuse to worship God in a way their understandings and consciences cannot approve; and we are of opinion with Dean Young in his Friendly Call to his Dissenting Brethren, that "whenever useless rites and ceremonies are imposed, corruptions are passed into a law, and the terms of communion are such as are not authorized by the law of Christ, then it becomes a duty to dissent, and they are the separatists who compel others to divide, not they who deplore the necessity of so doing." See TOLERATION.

NONCONFO'RMITY. *s.* (*non* and *conformity*.) 1. Refusal of compliance (*Watts*). 2. Refusal to join in the established religion.

NONE. *a.* (ne ane, Saxon.) 1. Not one (*Addison*). 2. Not any (*Fenton*). 3. Not other (*Genesis*). 4. *None of* sometimes signifies only emphatically *nothing* (*Psalms*).

NONE-SO-PRETTY, in botany. See SAXIFRAGE.

NONE'NTITY. *s.* (*non* and *entity*.) 1. Nonexistence (*Bentley*). 2. A thing not existing (*South*).

NONES, (*nonæ*,) in the Roman calendar, the fifth day of the months January, February, April, June, August, September, November, and December; and the seventh of March, May, July, and October. March, May, July, and October, had six days in their nones; because these alone, in the ancient constitution of the year by Numa, had 31 days a-piece, the rest having only 29, and February 30: but when Cæsar reformed the year, and made other months contain 31 days, he did not allot them six days of nones.

NONEXI'STENCE. *s.* (*non* and *existence*.) 1. Inexistence; negation of being. 2. The thing not existing (*Brown*).

NONJU'RING. *a.* (*non* and *juro*, Latin.) Belonging to those who will not swear allegiance to the Hanoverian family (*Swift*).

NONJURORS, those who refused to take the oaths to government, and who were in consequence under certain incapacities, and liable to certain severe penalties. It can scarcely be said that there are any nonjurors now in the kingdom; and it is well known that all penalties have been removed both from papists and protestants, formerly of that denomination, as well in Scotland as in England. The members of the episcopal church of Scotland have long been denominated nonjurors, but perhaps they are now called so improperly, as the ground of their difference from the establishment is more on account of ecclesiastical than political principles.

NONIUS, or NUNEZ (Peter), a very eminent Portuguese mathematician and physician, was born in 1497, at Alcazar in Portugal, anciently a remarkable city, known by the name of Salacia, from whence he was surnamed Salaciensis. He was professor of mathematics in the university of Coimbra, where he published some pieces, which procured him great reputation. He was mathematical preceptor to Don Henry, son to king Emanuel of Portugal, and principal cosmographer to the king. Nonius was very serviceable to the designs which this court entertained of carrying on their maritime expeditions into the East, by the publication of his book Of the Art of Navigation, and various other works. He died in 1577, at 80 years of age.

Nonius was the author of several ingenious works and inventions, and justly esteemed one of the most eminent mathematicians of his age. Concerning his Art of Navigation, father Dechales says, "In the year 1530, Peter Nonius, a celebrated Portuguese mathematician, upon occasion of some doubts proposed to him by Martinus Alphonsus Sofa, wrote a treatise on navigation, divided into two books; in the first, he answers some of those doubts, and explains the nature of loxodromic lines. In the second book he treats of rules and instruments proper for navigation, particularly sea-charts, and instruments serving to find the elevation of the pole; but says he is rather obscure in his manner of writing."—Furtiere, in his Dictionary, takes notice that Peter Nonius was the first who, in 1530, invented the angles which the loxodromic curves make with each meridian, calling them in his language rhumbs, and which he calculated by spherical triangles. —Stevinus acknowledges, that Peter Nonius was scarce inferior to the very best mathematicians of the age. And Schottus says, he explained a great many problems, and particularly the mechanical problem of Aristotle on the motion of vessels by oars. His notes upon Purbach's Theory of the Planets are very much to be esteemed: he there explains several things, which had either not been noticed before, or not rightly understood.

In 1542 he published a Treatise on the Twi-

light, which he dedicated to John the 3d, king of Portugal; to which he added what Alhazen, an Arabian author, has composed on the same subject. In this work he describes the method or instrument called, from him, a Nonius, a particular account of which see in the following article.—He corrected several mathematical mistakes of Orontius Finæus.—But the most celebrated of all his works, or that at least he appeared most to value, was his Treatise of Algebra, which he had composed in Portuguese, but translated it into the Castilian tongue, when he resolved upon making it public, which he thought would render his book more useful, as this language was more generally known than the Portuguese. The dedication, to his former pupil, prince Henry, was dated from Lisbon, Dec. 1, 1564. This work contains 341 pages in the Antwerp edition of 1567, in 8vo.

The catalogue of his works, chiefly in Latin, is as follows:

1. De Arte Navigandi, libri duo; 1530.
2. De Crepusculis; 1542.
3. Annotationes in Aristotelem.
4 Problema Mechanicum de Motu Navigii ex Remis.
5. Annotationes in Planetarum Theorias Georgii Purbachii, &c.
6. Libro de Algebra en Arithmetica y Geometra; 1564.

Nonius, the name which was not many years ago given to the common device for subdividing the arcs of quadrants and other astronomical instruments, from the persuasion that it was invented by Nonius or Nunez, of whom some account has been given in the preceding article. The generality of astronomers of the present age, transferring the honour of the invention from Nunez to Peter Vernier, a native of Franche Comté, have called this method of division by his name. (See Vernier.) Mr. Adams, however, in his Geometrical and Geographical Essays, has lately shown that Clavius the Jesuit may dispute the invention with them both. The truth seems to be, that Nunez started the idea, Clavius improved it, and Vernier carried it to its present state of perfection. The method of Nunez, described in his treatise De Crepusculis, printed at Lisbon in 1542, consists in describing within the same quadrant 45 concentric circles, dividing the outermost into 90 equal parts, the next within into 89, the next into 88, &c. till the innermost was divided into 46 only. On a quadrant thus divided, the plumb line or index must cross one or other of the circles very near a point of division: whence, by computation, the degrees and minutes of the arc might be easily ascertained. This method is also described by Nunez in his treatise De arte atque Ratione Navigandi, where he would fain persuade himself that it was not unknown to Ptolemy. But as the degrees are thus divided very unequally, and as it is very difficult to attain exactness in the division, especially when the numbers into which the arcs are to be divided are incomposite (of which there are no less than nine), the method of diagonals, first published by Thomas Digges, Esq. in a treatise entitled Alæ seu scalæ Mathematicæ, printed at London in 1573, and said to be invented by one Richard Chenseler, was substituted in its room. Nonius's method was, however, improved at different times and by different persons; and it must be acknowledged, that if Vernier saw either the original or any of the improvements (and there can be little doubt of his having seen them all), his merit is only that of having applied to a useful practical purpose the speculative invention of another person.

NON-NATURALS. Under this term physicians comprehend air, meat and drink, sleep and watching, motion and rest, retention and excretion, and the affections of the mind.

NONNIUS, a Greek poet, who was a native of Panapolis in Egypt in the 5th century. He wrote two books, one entitled, Dionysiacorum libri xlviii, printed at Antwerp, in 1569; and the other is a paraphrase in Greek verse on the gospel of St. John, edited by Aldus Manutius in 1501.

Nonnius (Louis), a learned physician of Antwerp in the 17th century. He wrote a famous book, entitled, Dieteticon, sive de Re Cibaria, which is full of learning and curious disquisition. He also printed a commentary in 1620 on the Greek medals.

NONPAREIL. *s.* (*non* and *pareil*, French.) 1. Excellence unequalled (*Shakspeare*). 2. A kind of apple. 3. Printers letter of a small size, on which small Bibles and Common Prayers are printed.

NO'NPLUS. *s.* (*non* and *plus*, Lat.) Puzzle; inability to say or do more (*Locke*).

To Nonplus. *v. a.* (from the noun.) To confound; to puzzle (*South*).

NONRE'SIDENCE. *s.* (*non* and *residence.*) Failure of residence (*Swift*).

NONRE'SIDENT. *s.* (*non* and *resident.*) One who neglects to live at the proper place (*Swift*).

Non-resident clergyman, one who does not reside at his benefice.

The following returns connected with the subject of non-resident clergymen's benefices, and non-conformists, were laid before Parliament in June 1810, when lord Harrowby moved for the sum of 100,000l. to be granted for the relief of the poorer clergy in this kingdom: they will, we doubt not, be highly interesting to all who are solicitous about the welfare of the established church, or the cause of religion in general.

1. Number and Classes of Non-Residents, for the Year 1807.

	TOTALS.	On livings under 150l. per Ann.	On livings above 150l. per Ann.
EXEMPTIONS.			
Residence on other benefices	1,797	684	1,113
Official chaplains	42	11	31
Chaplains to privileged individuals	51	5	46
Ecclesiastical, cathedral, and collegiate officers	340	116	224
Officers in the royal chapels of St. James's and Whitehall	1		1
Reader in his Majesty's private chapel at Windsor	2		2
Preachers and readers in the inns of court, or at the Rolls	8	2	6
Public officers and tutors in the universities of Oxford and Cambridge	93	24	69
Resident fellows in Oxford and Cambridge	26	23	3
Provost of Eton, warden of Winchester, fellows of both	11	1	10
Schoolmasters and ushers of Eton, Westminster, and Winchester	9	6	3
Students residing in Oxford and Cambridge under thirty years of age	21		21
Exemptions not notified	85	13	72
Livings held by bishops	23	3	20
Exempt	2,509	888	1,621
LICENCES.			
Infirmity of incumbent or family	480	431	349
Want or unfitness of parsonage house	946	435	511
Residence in a mansion within the parish belonging to incumbent or relative	152	33	119
Incumbents possessing small livings licensed to curacies	254	121	133
Schoolmasters or ushers of endowed schools	163	79	84
Master or preacher of hospitals	14	6	8
Endowed preacher or lecturer	29	6	23
Licensed preachers in proprietary chapels	13	4	9
Librarians of the British Museum, Sion College, and trustees of Lord Crew's charity	5	1	4
Incumbent's residing in the neighbourhood, and performing the duties of their parishes	476	247	229
Unenumerated cases confirmed by the archbishop	39	4	35
Unenumerated cases within the archbishop's dioceses	3		3
Licensed	2,574	1,067	1,507
Absence without licence or exemption	842	466	376
Dilapidated churches	32	12	20
Sinecures and dignities not requiring residence	163	5	158
	1,037	483	554
Totals of the above	6,120	2,438	3,682
Miscellaneous, i. e. for other reasons than those specified in the preceding classes	632	201	431
	6,752	2,639	4,113

2. Abstract of Returns, Residence, and Non-residence, for the Year ending March 25, 1808.

Dioceses.	No. Benefices in the Diocese.	Residents.	Non-Residents.	Doubtful, Vacant, &c.
St. Asaph	160	43	106	11
Bangor	137	48	83	6
Bath and Wells	478	146	271	61
Bristol	286	143	130	13
Canterbury	349	132	205	12
Carlisle	134	81	52	1
Chester	592	324	238	30
Chichester	306	104	184	18
St. David's	507	115	392	7
Durham	194	81	106	—
Ely	154	57	97	74
Exeter	606	231	201	—
Gloucester	284	98	184	2
Hereford	374	112	211	51
Landaff	205	34	164	7
Lichfield and Coventry	642	266	348	28
Lincoln	1315	411	840	64
London	631	323	286	22
Norwich	1145	305	813	27
Oxford	212	68	138	6
Peterborough	315	152	147	16
Rochester	107	54	51	2
Salisbury	483	138	249	96
Winchester	401	173	179	49
Worcester	238	94	140	4
York	909	679	205	25
Totals	11164	4412	6120	632

3. Livings under 150l. per Annum, with the Number of Residents and Non-Residents, (besides which there are in the different Dioceses 144 Livings under that Sum, which could not be identified.

Dioceses.	Total No.	Residents.	Non-Residents.	Doubtful, Vacant, &c.
St. Asaph	42	11	20	
Bangor	58	16	30	
Bath and Wells	136	23	106	4
Bristol	86	36	46	4
Canterbury	87	18	65	1
Carlisle	88	55	31	1
Chester	377	202	161	10
Chichester	77	17	59	
St. David's	344	47	278	
Durham	76	25	49	
Ely	64	19	45	
Exeter	154	28	78	24
Gloucester	89	19	62	4
Hereford	137	24	103	5
Landaff	147	23	119	4
Lichfield and Coventry	387	91	175	19
Lincoln	541	113	378	41
London	83	36	40	4
Norwich	272	35	223	7
Oxford	93	14	69	
Peterborough	77	23	45	
Rochester	3	—	3	
Salisbury	118	33	69	13
Winchester	82	24	34	23
Worcester	69	12	53	
York	410	260	98	
Totals	3997	1214	2438	201

4. Number of Places of Worship licensed in each Diocese during the present Reign, (exclusive of 2006 which have been licensed at the Sessions, and cannot be ranged under their respective Dioceses.)

St. Asaph	233	Landaff	20
Bangor	177	Lichfield	210
Bath and Wells	433	Lincoln	1537
Bristol	46	London	417
Canterbury	131	Norwich	1061
Carlisle	120	Oxford	81
Chester	648	Peterborough	210
Chichester	213	Rochester	134
St. David's	—	Salisbury	474
Durham	260	Winchester	519
Ely	84	Worcester	152
Exeter	518	York	2067
Gloucester	238		
Hereford	71	Total	10154

5. Licenses for Places of Worship not of the Church of England.

Periods of Seven Years.	In Bishops' Registers.	At Quarter Sessions.	Total.
1760 to 1766	387	284	671
1767 to 1773	391	193	584
1774 to 1780	652	246	898
1781 to 1787	665	213	878
1788 to 1794	1486	386	1872
1795 to 1801	3185	392	3577
1802 to 1808	3288	292	3680
	10154	2006	12160

6. Licenses to Preachers not of the Church of England.

Periods of Seven Years.	At Quarter Sessions.
1760 to 1766	80
1767 to 1773	38
1774 to 1780	179
1781 to 1787	379
1788 to 1794	610
1795 to 1801	1,318
1802 to 1808	1,068
	3,672

NONRESI'STANCE. *s.* (*non* and *resistance.*) The principle of not opposing the king; ready obedience to a superiour.

NO'NSENSE. *s.* (*non* and *sense.*) 1. Unmeaning or ungrammatical language. 2. Trifles; things of no importance.

NONSE'NSICAL. *a.* (from *nonsense.*) Unmeaning; foolish (*Ray.*)

NONSE'NSICALNESS. *s.* (from *nonsensical.*) Ungrammatical jargon; foolish absurdity.

NONSO'LVENT. *a.* (*non* and *solvent.*) Who cannot pay his debts.

NONSOLU'TION. *s.* (*non* and *solution.*) Failure of solution (*Broome*).

NONSPA'RING. *a.* (*non* and *sparing.*) Merciless; all-destroying (*Shakspeare*).

To NONSU'IT. *v. a.* (*non* and *suit.*) To deprive of the benefit of a legal process for some failure in management (*Swift*).

NONUPLA, in the Italian music, denotes a quick time, peculiar to jigs. This species of time is otherwise called the measure of nine times, which requires two falls of the hand, and one rise. There are three sorts of nonupla. 1. Nonupla di semiminime, or dupl. sesquiquarta, thus marked $\frac{9}{4}$, where nine crotchets are to be in the bar, of which four make a semi-breve, in common time, i. e. in the down stroke six, and but three up: it is usually beat adagio. 2. Nonupla di croma, or sesqui ottava, marked thus $\frac{9}{8}$, wherein nine quavers make a bar instead of eight in common time, i. e. six down and three up: it is beat presto. 3. Nonupla di semi-crome, or super setti partiente nona, thus distinguished $\frac{9}{16}$, in which nine semiquavers are contained in a bar, whereof sixteen are required in common time, six down and three up: it is ordinarily beat prestissimo.

NOO'DLE. *s.* (from *noddle* or *noddy.*) A fool; a simpleton.

NOOK. *s.* (from *een hoeck*, German.) A corner (*Davies*).

NOON. *s.* (non, Saxon; *nawn*, Welsh). 1. The middle hour of the day; twelve; the time when the sun is in the meridian; midday (*Dryden*). 2. It is taken for midnight (*Dryden*).

NOON. *a.* Meridional (*Young*).

NOO'NDAY. *s.* (*noon* and *day.*) Midday (*Shakspeare*).

NOO'NDAY. *a.* Meridional (*Addison*).

NOO'NING. *s.* (from *noon.*) Repose or repast at noon.

NOO'NTIDE. *s.* (*noon* and *tide.*) Midday; time of noon (*Shakspeare*).

NOO'NTIDE. *a.* Meridional (*Shakspeare*).

NOOSE. *s.* (*nosada*, entangled.) A running knot which the more it is drawn binds the closer (*Sandys*).

To NOOSE. *v. a.* (from the noun.) To tie in a noose; to catch (*Govern. of Tongue*).

NOOTH'S APPARATUS, in chemistry, a machine for saturating fluids with various gasses. It consists of three glass vessels, the lowest of which has a very broad, flat bottom, that the whole may stand steadily. It contains the materials from which the gass is given out, as marble dust, as diluted sulphuric acid, for example, when a carbonated liquid is to be prepared, which is commonly the case; and of these materials a supply is from time to time to be added through an opening made in the side of the vessel for this purpose, the stopper of which must fit very accurately. The gass passes through a valve into the second vessel, which contains the liquor to be impregnated. This part of the machine consists of a portion of a glass tube open at bottom and closed at top, but perforated with several small holes, and fitting closely into the bottom of the vessel that contains the liquor. The inner part of the tube is partly filled with two thick pieces of glass tube with small perforations The space between these two pieces is occupied by a glass valve in the form of a plano convex lens, which lies flat upon the lower piece, on which it fits smoothly, and is easily lifted up by the influx of gass from below, sufficient to allow it to pass, whilst it is so far confined that it cannot be turned over, but immediately falls down again in its proper place.

The middle vessel, which is usually made in the form of an urn, has a glass stop-cock to draw off the liquor by, and into it dips the end of the uppermost vessel, of a smaller size, but of the same shape, which is intended to afford a small pressure on the gass, and also a constant circulation of the liquor from the one to the other by means of a bent tube, in which the uppermost vessel terminates, and which passes down into the middle vessel through an aperture in its top. At the upper part of this last vessel is a stopper, which is the only joining of the whole apparatus which is not required to fit very tight, as it is intended to allow the excess of gass to escape.

In using this apparatus, so much liquor should be poured into the middle vessel as to rise some way above the bottom of the tube of the upper vessel that dips down. The gass then being generated in the lowest vessel, rises through the water of the middle vessel to its upper part, when, not being able to escape, it accumulates, and by its pressure causes the liquor to flow through the bent tube into the uppermost vessel, driving the atmospherical air before it. When the liquor has by this means fallen below the lever of the dip of the bent tube, the gass rises through this tube, and in its passage agitates the liquor in the uppermost vessel, and sends down a portion: and thus a

constant agitation is kept up, which considerably favours the exhaustion.

The chief inconvenience of this machine is the number of parts of which it is formed, and the accurate grinding required for all the pieces that fit, which makes the apparatus expensive, and not easily repaired when any portion is broken. And hence various improvements have been attempted; one of the best of which is that invented by the late Dr. Hamilton.

It should be observed, however, that the utmost effect of the best glass vessels in impregnating water with carbonic acid, or any other gass, is very far short of the power of the forcing pump: by which method alone all the brisk, foaming, carbonated waters are made, which are consumed so largely under the names of artificial Seltzer, soda, Pyrmont waters, &c. Mr. Paul of Geneva appears to have been the first who adopted this excellent method of making artificial mineral waters.

NOOTKA SOUND, a bay discovered by captain Cook, in 1778, on the west coast of North America. Lon. 146. 28 W. Lat. 49. 33 N. Captain Cook gave it the name of King George's Sound; but the natives call it Nootka; the name now generally adopted by the English. It is not situate on the continent, as Cook had reason to suppose, but on an island, to which captain Vancouver, who coasted it in 1792, gave the name of Quadra and Vancouver Island, the former being the name of the Spanish commandant on the coast. The woods are composed of the Canadian pine, white cypress, and two or three other sorts of pine; and in general they are of a large size. About the rocks and borders of the woods were seen some strawberry plants, and raspberry, currant, and gooseberry bushes, all in a flourishing state. The principal animals seen here were racoons, martens, and squirrels. Birds are far from being numerous, and those that are to be seen are remarkably shy. The stature of the natives is, in general, below the common standard; but their persons are not proportionably slender, being usually pretty plump, though not muscular. The women are of the same size and form as the men; nor is it easy to distinguish them, as they possess no natural feminine graces. Their bodies are always covered with red paint; but their faces are ornamented with a variety of colours, a black, a bright red, or a white colour. They are docile, courteous, and good-natured; but quick in resenting injuries, and, like most other passionate people, as quickly forgetting them. Their weapons are bows and arrows, slings, spears, short truncheons of bone, and a small ax, not unlike the common American tomahawk. A rattle and a small whistle are the only instruments of music that were seen among them. Their houses consist of very long broad planks, resting upon the edges of each other, tied, in different parts, with withes of pine bark. Their furniture consists principally of chests and boxes of various sizes, piled upon each other, at the sides and ends of their houses, in which are deposited their garments, and whatever they deem valuable; they have also square and oblong pails, bowls to eat their food out of, &c. The irregularity and confusion of their houses is exceeded by their nastiness and stench: every thing stinks of train oil, fish, and smoke; and every part is as filthy as can be imagined. In 1786, a few British merchants in the East Indies formed a settlement in this place, to supply the Chinese market with furs; but the Spaniards, in 1789, captured two English vessels, and took possession of the settlement. The British ministry made their demand of reparation, and the affair was amicably terminated by a convention.

NOPAL. See COCCINELLA.

NOPALXOCHI QUETZALLI. See CACTUS.

NOPE. *s.* A kind of bird called a bull-finch or redtail.

NOR. *conjunct.* (*ne or.*) 1. A particle marking the second or subsequent branch of a negative proposition: as, *neither poor* nor *rich.* 2. Two negatives are sometimes joined, but ill: *I have not done it,* nor *I know not when I shall do it.* 3. *Nor* is in poetry used in the first branch for neither: as, *I* nor *love myself, nor thee.*

NORAX, a son of Mercury and Eurythea, who led a colony of Iberians into Sardinia.

NORBANUS, (C.) a young and ambitious Roman, who opposed Sylla, and joined his interest to that of young Marius. In his consulship he marched against Sylla, by whom he was defeated.

NORBERG, a town of Sweden, in Westmanland, near which are the best iron mines in the province. It is 34 miles N. of Stroemsholm. Lon. 16. 12 E. Lat. 60. 2 N.

NORCIA, a town of Italy, in the duchy of Spoleto, seated among mountains, on the river Fredara, 20 miles S.E. of Spoleto.

NORD, a department of France, so named from being the most northern in situation. It includes the late French provinces of Hainault, Flanders, and Cambresis. Douay is the capital.

NORDBURG, a town of Denmark, at the N. extremity of the isle of Alsen, with a castle, nine miles N.N.W. of Sunderburg.

NORDEN, a seaport of Westphalia, in E. Friesland, and a considerable place of trade, with a good harbour. It is four miles from the German ocean, and 14 N. of Emden. Lon. 7. 13 E. Lat. 53. 32 N.

NORDGAU. See BAVARIA (Palatinate of).

NORDHAUSEN, a town of Upper Saxony (lately imperial), in Thuringia, with seven Lutheran churches, and a well-built orphan-house. It has a considerable trade in corn, brandy, and rape and linseed oil, with manufactures of marble and alabaster. It is seated on the Zorge, 35 miles N.N.E. of Erfurt. Lon. 10. 56 E. Lat. 51. 30 N.

NORDHEIM, a town of Lower Saxony, in the duchy of Brunswick, situate on the Rhume, at its conflux with the Leina, ten miles N. of Gottingen.

NORDKOPING, a seaport of Sweden, capital of East Gothland. It is 10 miles in circumference, but the houses are scattered, and the inhabitants do not exceed 12,000. The river Motala flows through the town, forms a series of cataracts, and is divided into four principal streams, which encircle several rocky islands, covered with buildings; but at the extremity of the town it is navigable for large vessels. Here are manufactures of woollen cloth, paper, and fire-arms; some sugar-houses, and a brass foundery. Corn is exported hence in great quantities; and a salmon fishery gives employment and riches to many of the inhabitants. It is 110 miles S.W. of Stockholm. Lon. 15. 50 E. Lat. 58. 35 N.

NORDLAND, one of the five grand divisions of Sweden, bounded on the N by Lapland, E. by the gulf of Bothnia, S. by Sweden Proper, and W. by the same and Norway. It contains six provinces.

NORDLINGEN, a town of Suabia, lately imperial, and fortified in the ancient manner. Here the league of the five western circles of the empire was concluded in 1702. In 1796 it was taken by the French. It is a commercial place, seated on the Eger, 38 miles N.N.W. of Augsburg. Lon. 10. 34 E. Lat. 48. 50 N.

NORDMALING, a town of Sweden, in Angermania, near a bay of the gulf of Bothnia, 24 miles S.W. of Uma, and 70 N.E. of Hernosand.

NORDSTRAND, an island of Denmark, on the W. coast of South Jutland, 12 miles long and five broad. It has a town called Ham, 28 miles W. of Sleswick. Lon. 9. 0 E. Lat. 54. 40 N.

NORFOLK, a county of England, 77 miles long and 45 broad; bounded on the N. and E. by the German ocean, S.E. and S. by Suffolk, and W. by Cambridgeshire and Lincolnshire. It contains 1,694,400 acres; is divided into 32 hundreds, and 660 parishes; has one city and 32 market towns; and sends 12 members to parliament. The number of inhabitants in 1801 was 273,371. The products vary according to the soil and situation. The lighter arable lands produce barley in great plenty; wheat is cultivated in the strongest soils; and turnips are grown here in great quantities: much buck-wheat is also grown in the light soils, and used for feeding swine and poultry. The fenny parts yield great quantities of butter; which is sent to London under the name of Cambridge butter. The sheep are a hardy small breed, much valued for their mutton. Turkeys are reared here to a larger size than elsewhere; rabbits are extremely numerous on the sandy heaths; and there is abundance of game, especially of pheasants. The manufactures of Norfolk are worsted, woollen, and silks. Its principal rivers are the Great Ouse, Nen, Little Ouse, Waveney, Yare, and Bure. Norwich is the capital.

NORFOLK, a seaport of Virginia, capital of a county of the same name. It was burnt in 1776, by order of the British governor; but is now the most considerable commercial town in the state. The chief exports are tobacco, flour, corn, staves, and lumber. Here are two churches, and the harbour is large enough to contain 300 ships. The town stands on the E. side of Elizabeth river, near its entrance into the estuary of James river, 108 miles E.S.E. of Richmond. Lon. 76. 40 W. Lat. 36. 55 N.

NORFOLK ISLAND, an island in the Pacific Ocean, lying E. of New South Wales, and settled by a colony of convicts, subordinate to that government. It is very hilly, but some of the valleys are tolerably large. Mount Pitt, the only remarkable hill, is 12,000 feet high. The whole island is covered by a very thick forest, choked with underwood, and the principal timber tree is the pine, which is very useful in building, and seems to be durable. The soil, when cleared, may be rendered very productive; and the air is very wholesome. The spring is perceptible in August; but the trees are in a constant succession of flowering and fruiting the year round. In summer the heat is excessive; from February to August may be called the rainy season; and the winter, from April to July, is very pleasant. This island is supplied with many streams of good water, which abound with very fine eels. The cliffs round the coast are 240 feet high, quite perpendicular; and the want of a safe harbour is a great inconvenience. The settlement is formed in Sydney Bay, on the S. side of the island. Lon. 168. 12 E. Lat. 29. 4 S.

NORHOLM, a town of Norway, in the diocese of Christiansand, 16 miles N.N.E. of Christiansand.

NORICUM, a country of ancient Illyricum, which now forms a part of modern Bavaria and Austria. It extended between the Danube, and part of the Alps and Vindelicia. Its inhabitants made many incursions upon the Romans, and were at last conquered under Tiberius. The iron that was drawn from Noricum was esteemed excellent, and thence *noricus ensis*, to express the goodness of a sword.

NORIS (Henry), a celebrated cardinal, was born at Verona in 1631, and educated by his father, who was a native of Ireland. He afterwards entered among the monks of St. Augustine, and acquired great reputation on account of his learning. In 1673, he published his History of Pelagianism, which gave great offence to several persons, who accused him to the pope of being heterodox, but with so little success, that Clement X. made him under-librarian of the Vatican; and in 1695 he obtained a cardinal's hat. He died in 1704. His works are numerous, and were published at Verona in 1730, in 5 vols. folio.

NORLAND, one of the five general divisions of Sweden, comprehending the provinces of Gestrikeland, Helsingland, Medelpadia, Hiemtland, Herjedalia, Ongermania, and West Bothnia.

NORLANDICÆ BACCÆ. The fruit of the rubus arcticus of Linnéus, which this illustrious character found very grateful and refresh-

ing in his tour through the northern part of Sweden. In putrid fever, exanthematous diseases, and scurvy, they promise to be, like other summer fruits, very serviceable.

NORMANDY, a late province of France, bounded on the W. by the Atlantic, on the N. by the English Channel, on the E. by Picardy and the Isle of France, and on the S. by Perche, Maine, and Bretagne. It is one of the most fertile in France, and abounds in all things except wine, but that defect is supplied by cider and perry. It contains iron, copper, and a great number of rivers and harbours. This province now forms the departments of Calvados, Eure, the Channel, Orne, and Lower Seine.

NORMAL, a perpendicular. In the conic sections it is a line drawn from any point in the curve perpendicular to the tangent there, to meet the axis.

NORRIS (John), an English divine, born 1657, at Collingborne-Kingston, Wilts, and educated at Winchester school, and Exeter college, Oxford. In 1689 he succeeded to the rectory of Newton St. Loe, Somersetshire, and in 1691 was made rector of Bemerton, near Sarum, where he died a martyr to intense study, 1711, aged 54. Mild, humble, and amiable in his manners, he was an enthusiast as a man, a mystic in theology, and in philosophy an idealist. He attacked Locke's Essay on the Human Understanding, and wrote against Dodwell on the Immortality of the Soul. His works are chiefly on moral and theological subjects.

NORRIS (John), a native of Norfolk, educated at Eton, and King's college, Cambridge. He gave to his university an estate of 190*l.* a year for a theological professorship, and for annual prizes on divinity subjects. He died 1777, aged 43.

NORRISTOWN, a town of the United States, capital of the county of Montgomery, in Pennsylvania. It is seated on the Schuylkill, 12 miles N.W. of Philadelphia. Lon. 75. 24 W. Lat. 40. 7 N.

NORTELGA, or NOR TELGE, a seaport of Sweden, in the province of Upland. This town suffered much from the ravages committed here by the Russians in 1719: near it is a forge for making fire-arms. It is 30 miles N.E. of Stockholm. Lon. 10. 32 E. Lat. 50. 44 N.

NORTH, one of the four cardinal points of the world; being that point of the horizon which is directly opposite to the sun in meridian. The north wind is generally accompanied with a considerable degree of cold. It sometimes blows with almost irresistible fury. It is often mentioned by the classic authors under the name of *Boreas*, which is of Greek original. See BOREAS.

NORTH-POLE. See POLE.

NORTH (Francis), lord keeper of the great seal under Charles II. and James II. was educated at Bury school, and St. John's college, Cambridge, and then entered at the Middle Temple. He, on the Norfolk circuit, distinguished himself as an able, acute, and discerning lawyer, and rose through the offices of solicitor and attorney-general to the place of chief justice of the common pleas. On the death of Nottingham he succeeded to the seals, and in 1683 was raised to the peerage. He died at his house at Wroxton, 1685. He wrote an index of verbs neuter, finished while at school, and printed with Lily's grammar—a paper on the gravitation of fluids, considered in the bladders of fishes—an essay on music—political papers, &c.

NORTH (Dr. John), brother to the preceding, was educated at Bury school, and Jesus college, Cambridge. In 1672 he was made Greek professor of the university, prebendary of Westminster 1673, and in 1677 he succeeded Dr. Barrow as master of Trinity college. He completed the college library begun by his predecessor, and died 1683. He edited Plato's Socratis Apologia—Crito—Phœdo, &c. 1673.

NORTH (George), of London, was educated at St. Paul's, and at Benet college, Cambridge. He was vicar of Codicote, Herts, and died on his living 1772. He wrote a table of English silver coins from the conquest to the commonwealth—remarks on the money of Henry III.—and he began a history of the Antiquarian Society.

NORTH (Frederic), Earl of Guildford, better known as lord North, the minister under whose administration England lost her American colonies. He succeeded Charles Townsend as chancellor of the exchequer; and in 1770 the duke of Grafton, as first lord of the treasury, and continued in office till the conclusion of the war. As a public character, lord North was a flowing and persuasive orator, and skilled in argumentation, and master of great presence and coolness of mind; and in private life he was very amiable, cheerful, and jocose in conversation, the friend of learned men, and correct in his conduct. During the last years of his life he was afflicted with blindness. He died 1792, aged 60.

NORTH, or NORD, a department of France, including the late French provinces of Hainault, Flanders, and the Cambresis.

NORTH CAPE, the most northern promontory of Europe, on the coast of Norway. Lon. 25. 57 E. Lat. 71. 20 N. A very interesting description of the scenery at North Cape is given in Acerbi's Travels through Sweden.

NORTH COAST, a department of France. See COTES DU NORD.

NORTH. *a.* Northern (*Numbers*).

NORTHALLERTON, a borough in the north riding of Yorkshire, with a market on Wednesday. It sends two members to parliament, and is seated on a small brook, which, a mile below, runs into the river Wisk. It is a well-built trading place, 30 miles N.N.W. of York, and 223 N. by W. of London. Lon. 1. 20 W. Lat. 54. 23 N.

NORTHAMPTON, a county of Pennsyl-

vania, 111 miles long and 35 broad. In 1790 it contained 24,250 inhabitants. Easton is the capital.

NORTHAMPTON, a town of the United States, the capital of Hampshire, in Massachusets, situate on the Connecticut, 100 miles W. of Boston.

NORTHAMPTON, a town in England, capital of a county of the same name, situated in W. lon. 1. 11 N. lat. 52. 11. According to Camden, it was formerly called North-afandon, from its situation on the north of the river Nen, called anciently Aufona, by which and another lesser river it is almost inclosed. Dr. Gibson says, that the ancient Saxon annals called both it and Southampton simply Hampton; and afterwards, to distinguish them, called the one, from its situation, Southampton, and the other Northampton; but never North-afandon. Though it does not appear to be a place of very great antiquity, nor to have emerged from obscurity till after the conquest, it has sent members to parliament since the reign of Edward I. and being in the heart of the kingdom, several parliaments have been held at it. There was also a castle, and a church dedicated to St. Andrew, built by Simon de Sancto Licio, commonly called Senlez, the first earl of Northampton of that name. It is said to have been burnt down during the Danish depredations; but in the reign of St. Edward appears to have been a considerable place. It was besieged by the barons in their war with king John; at which time that military work called Hunshill is supposed to have been raised. In the time of Henry III. it sided with the barons, when it was besieged and taken by the king. Here the bloody battle was fought in which Henry VI. was taken prisoner. It was entirely consumed by a most dreadful fire in 1675; yet, by the help of liberal contributions from all parts of the country, it hath so recovered itself, that it is now one of the neatest and best-built towns of the kingdom. Among the public buildings, which are all lofty, the most remarkable are the church called All-hallows (which stands at the meeting of four spacious streets), the sessions and assize house, and the George inn, which belongs to the poor of the town. A county-hospital or infirmary has been lately built here, after the manner of those of Bath, London, Bristol, &c. It has a considerable manufacture of shoes and stockings; and its fairs are noted for horses both for draught and saddle; besides, it is a great thoroughfare for the north and west roads. It was formerly walled, and had seven churches within and two without. The horse-market is reckoned to exceed all others in the kingdom, it being deemed the centre of *all* its horse-markets and horse-fairs, both for saddle and harness, and the chief rendezvous of the jockies both from York and London. Its principal manufacture is shoes, of which great numbers are sent beyond sea; and the next to that, stockings and lace, as we have hinted at above. It is the richer and more populous, by being a thoroughfare both in the north and west roads; but, being 80 miles from the sea, it can have no commerce by navigation. The walls of this town were above two miles in compass. In 1801 it contained 1371 houses, and 7020 inhabitants. It had formerly a nunnery in the neighbouring meadows, with several other monasteries; and of its very old castle on the west side of the town, a small part of the ruins are still to be seen. Some discontented scholars came hither from Oxford and Cambridge, about the end of the reign of Henry III. and, with the king's leave, prosecuted their studies here academically for three years; during which there was the face of an university, till it was put a stop to by express prohibition, because it was a damage to both universities. The public horse-races are on a neighbouring down, called Pye-leys. In and about the town are abundance of cherry-gardens. Within half a mile of the town is one of the crosses erected by king Edward I. in memory of his queen Eleanor, whose corpse was rested there in its way to Westminster. On the north side of the river, near that cross, many Roman coins have been ploughed up. At Guilesborough, north-west of Northampton, are to be seen the vestiges of a Roman camp, the situation of which is the more remarkable, as lying between the Nen and the Avon, the only pass from the north to the south parts of England not intercepted by any river. This camp was secured only by a single intrenchment, which was, however, very broad and deep.

NORTHAMPTONSHIRE, a county of England, 60 miles long and 22 where broadest; bounded on the S. by Buckinghamshire and Oxfordshire, W. by the latter county and Warwickshire, N.W. by Leicestershire and Rutlandshire, N. by Lincolnshire, and E. by the counties of Cambridge, Huntingdon, and Bedford. It contains 617,000 acres; is divided into 20 hundreds, and 336 parishes; has one city and 11 market-towns; and sends nine members to parliament, viz. two for the county, two for the borough of Northampton, two for the city of Peterborough, two for Brackley, and one for Higham Ferrers. The number of inhabitants in 1801 was 131,757. In the N.E. part, near Peterborough, commences a fenny tract, extending to the Lincolnshire Wash. With this single exception, Northamptonshire is said to contain less waste ground, and more seats of the nobility and gentry, than any other county. Its greatest defect is a scarcity of fuel, which is but scantily supplied by its woods; and though coal is brought by the river Nen, it is at a very dear rate. This county, however, possesses some considerable remains of its old forests, particularly those of Rockingham on the N.W., and of Salcey and Whittlebury, on the S. Its products are, in general, the same with those of other farming counties; but it is peculiarly celebrated for grazing land. Horned cattle, and other animals, are fed to extraordinary

sizes; and many horses of the large black breed are reared. Woad for the diers is cultivated here; but the county is not distinguished for manufactures. The principal rivers are the Nen and Welland; beside which it is partly watered by the Ouse, Leam, Cherwell, and Avon.

NORTHE'AST. *s.* (*north* and *east.*) The point between the north and east (*Arbuthnot*).

NO'RTHERLY. *a.* (from *north.*) Being towards the north (*Denham*).

NO'RTHERN. *a.* (from *north.*) Being in the north (*Shakspeare*).

NORTHERN LIGHTS. See AURORA BOREALIS.

NORTHFLEET, a village in Kent, seated on the Thames, two miles W. of Gravesend. The church is very large, and contains fragments of mountains as ancient as the fourteenth century. Vast quantities of lime are made here, and great numbers of extraneous fossils have been dug up.

NORTHLEACH, a town in Gloucestershire, with a market on Wednesday, seated near the source of the Lech, 25 miles E. of Gloucester, and 81 W. by N. of London.

NORTHOP, a village of Wales, in Flintshire, three miles S.E. of Flint; noted for its manufactures of coarse earthen-ware, fire-bricks, &c.

NO'RTHSTA'R. *s.* (*north* and *star.*) The polestar; the lode-star (*Shakspeare*).

NORTHUMBERLAND, the most northern county of England. In the Saxon heptarchy it was a part of the kingdom of the Northumbrians, which contained also the counties of York, Lancaster, Durham, Cumberland, and Westmoreland, and received its name from being situate N. of the Humber. It is of a triangular form, 64 miles the greatest length, and 50 the greatest breadth; bounded on the E. by the German ocean, S. by the bishopric of Durham, W. by Cumberland and Scotland, and N. by the detached part of Durham called Norhamshire and Islandshire. It contains 1,157,760 acres; is divided into six wards, and 460 parishes; and has ten market-towns. The number of inhabitants in 1801 was 157,101; and it sends six members to parliament. The soil is various; the E. part fruitful in most sorts of corn, with rich meadows on the banks of the rivers; but the W. part is mostly heathy and mountainous. The S.E. part abounds with thick seams of coal; and the S.W. angle has rich lead mines. Limestone and iron ore abound in various parts. The principal rivers are the Tyne, Coquet, Aln, and Blyth. Alnwick is the county town; but the largest is Newcastle.

The Northumbrians were anciently stigmatized by the Scotch as a savage, barbarous people, addicted to cruelty, and inured to rapine. The truth is, before the union of the two crowns of England and Scotland, the borderers on each side were extremely licentious and ungovernable, trained up to war from their infancy, and habituated to plunder by the mutual incursions made into each kingdom; incursions which neither truce nor treaty could totally prevent. People of a pacific disposition, who proposed to earn their livelihood by agriculture, would not on any terms remain in a country exposed to the first violence of a bold and desperate enemy; therefore the lands lay uncultivated, and in a great measure deserted by every body but lawless adventurers, who subsisted by theft and rapine. There was a tract fifty miles in length and six in breadth, between Berwick and Carlisle, known by the name of the Debateable Land, to which both nations laid claim, though it belonged to neither; and this was occupied by a set of banditti who plundered on each side, and what they stole in one kingdom, they sold openly in the other: nay, they were so dexterous in their occupation, that by means of hot bread applied to the horns of the cattle which they stole, they twisted them in such a manner, that, when the right owner saw them in the market, they did not know their own property. Wardens were appointed to guard the marches or borders in each kingdom; and these offices were always conferred on noblemen of the first character for influence, valour, and integrity. The English border was divided into three marches, called the east, west, and middle marches; the gentlemen of the country were constituted deputy-wardens, who held march-courts, regulated the watches, disciplined the militia, and took measures for assembling them in arms at the first alarm: but in the time of peace between the two nations, they were chiefly employed in suppressing the insolence and rapine of the borderers. Since the union of the crowns, however, Northumberland is totally changed, both with respect to the improvement of the lands, and the reformation of the inhabitants. The grounds being now secure from incursion and insult, are settled by creditable farmers, and cultivated like other parts of the kingdom. As hostilities have long ceased, the people have forgot the use of arms, and exercised themselves in the more eligible avocations of peace; in breeding sheep and cattle, manuring the grounds, working at the coal-pits, and in different branches of commerce and manufacture. In their persons they are generally tall, strong, bold, hardy, and fresh-coloured; and though less unpolished than their ancestors, not quite so civilised as their southern neighbours. The commonalty are well fed, lodged, and clothed; and all of them remarkably distinguished by a kind of shibboleth or whurle, being a particular way of pronouncing the letter *R*, as if they hawked it up from the wine-pipe, like the cawing of rooks. In other respects, the language they speak is an uncouth mixture of the English and Scottish dialects. There is no material distinction between the fashionable people of Northumberland and those of the same rank in other parts of the kingdom: the same form of education will produce the same effects in all countries. The gentlemen of Northumberland, however, are remarkable for their courage, hospitality, and hard drinking.

The number of inhabitants is reckoned 120,400, of houses 22,740.

A great number of Roman monuments have been found in this county; but the most remarkable curiosity of that kind consists in the remains of Hadrian's vallum and the wall of Severus.

The most noted towns in Northumberland, are Newcastle, Morpeth, Alnwick, Berwick, Hexham, and North Shields. It sends two members to parliament.

NORTHUMBERLAND, a town of Pennsylvania, in the county of its name, seated in the angle formed by the junction of the W. and E. branches of the Susquehanna, two miles above Sunbury, and 138 N.W. of Philadelphia.

NORTHUMBERLAND ISLANDS, a chain of islands in the Pacific ocean, near the N.E. coast of New Holland. Lon. 152 E. Lat. 22 S.

NORTHUMBERLAND STRAIT, the S. part of the gulph of St. Lawrence, between the island of St. John and the coast of New Brunswick and Nova Scotia.

NORTHWARD. *a.* (*north* and ƿeaƿð, Sax.) Being towards the north.

NORTHWARD. *ad.* (*north* and ƿeaƿð, Sax.) Toward the north (*Shakspeare*).

NORTHWEST. *s.* (*north* and *west.*) The point between the north and west (*Brown*).

NORTHWIND. *s.* (*north* and *wind.*) The wind that blows from the north (*Milton*).

NORTHWICH, a town in Cheshire, with a market on Friday, a cotton manufacture, and considerable salt-works. Mines of solid rock salt have been dug here to a great depth, from which immense quantities are raised; and much of it, in its crude state, is conveyed to Liverpool to be exported. Northwich is seated on the Dan, at its junction with the Weever, 20 miles N.E. of Chester, and 174 N.W. of London.

NORTON, a town of Massachusets, in Bristol county. A great quantity of nails is made here, and it has a manufacture of ochre similar to that of Taunton. It is 28 miles S. of Boston.

NORTON, or CHIPPING NORTON, a town in Oxfordshire, with a market on Wednesday. Here is a freeschool founded by Edward VI. and a manufacture of horse-cloths, tilting, &c. It is 12 miles S.W. of Banbury, and 73 N.W. of London.

NORTON (Thomas), an English writer, born at Sharpenhoe, Bedfordshire. He was a barrister, and in his principles a strong Calvinist. He assisted Sternhold and Hopkins in their version of the Psalms; and to the 27 which he turned to metre appear the initials of his name. He also translated into English some Latin poems, Calvin's Institutions, and Nowell's large Catechism; and assisted Sackville in his play called Ferrex and Porrex. He wrote besides, an Epistle to the Queen's poor deluded Subjects, and other pieces against popery, and died about 1600.

NORWAY, a kingdom of Europe, the most westerly part of the ancient Scandinavia. It is bounded on the N. and W. by the Northern Ocean, on the E. by Swedish Lapland and Sweden, and on the S. by the Categate; extending from the Naze in lat. 57. 30, to the North Cape in lat. 71. 20. Its breadth, which is very unequal, is from 30 to 280 miles. It is divided into the four governments of Aggerhuys, or Christiania, Christiansand, Bergen, and Drontheim. From its rocky soil and northern position, Norway is not populous in proportion to its extent. Mr. Coxe has calculated the number of inhabitants to be 750,000. They maintain their own army, which consists of 24,000 foot and 60 0 cavalry. Their troops are much esteemed for their bravery, and, like the Swiss mountaineers, are exceedingly attached to their country. Norway is blessed with a particular code, called the Norway Law, compiled by Grieffelfeld, at the command of Christian V. the great legislator of his country. By this law, peasants are free, a few only excepted on some noble estates near Fredericstadt: and the benefits of this code are visible in the great difference, in their appearance, between the free peasants in Norway and the enslaved vassals of Denmark, though both living under the same government. The Norwegian peasants possess much spirit and fire in their manner; are frank, open, and undaunted, yet not insolent; never fawning to their superiors, yet paying proper respect to those above them. The same causes which affect the population of Norway, operate likewise on the state of tillage, for the country does not produce sufficient corn for its own consumption; but it is rich in pasture, and produces much cattle. The fisheries, particularly on the W. coast, find employment and wealth for the natives, and supply the finest sailors for the Danish fleet. The principal fish, which, dried and salted, furnish a considerable article of exportation, are cod, ling, and whiting: their livers also yield train oil: and the smallest are given as winter fodder to the cattle. The extensive forests of oak and pine produce timber, spars, beams, and planks, beside charcoal, turpentine, bark, fuel, and even manure; and the birch (the bark of which is used as a covering for the roofs of houses) not only supplies fuel, but also a kind of wine. The general exports are tallow, butter, salt, dried fish, timber, planks, horses, horned cattle, silver, alum, Prussian blue, copper, and iron. It abounds in lakes and rivers; the former so large that they appear like inlets of the sea. Norway was formerly governed by its own hereditary sovereigns. On the demise of Hagen V. in 1319, without male issue, his grandson in the female line, Magnus Smek, united in his person the kingdoms of Sweden and Norway. Magnus was succeeded in the kingdom of Norway by his son Hagen VI. husband of the celebrated Margaret, and, at his decease, in 1380, Norway was united to Denmark by their son Olof V. who dying without issue, Margaret herself was raised to the throne by the unanimous voice of the nation. On her death, it descended, with Denmark and Sweden, to her nephew

Eric. Sweden was afterwards separated from Denmark by the valour and address of Gustavus Vasa; but Norway continues united to Denmark. The capital is Christiania.

NORWAY RAT. See MUS.

NORWICH, an ancient and populous city, the capital of Norfolk, with a market on Wednesday, Friday, and Saturday. It is surrounded by a wall, now much decayed, and seated on the Yare, which runs through it, and is navigable to Yarmouth, without locks. Although of considerable extent, the population is not so great as might be expected, as it contains a number of gardens and orchards within the walls. It is a county of itself, governed by a mayor, and sends two members to parliament. There are, besides the cathedral, 36 parish churches, some of which were formerly covered with thatch, two churches for the Flemings, several dissenting meeting-houses, and a Roman catholic chapel. It has a stately castle, on a hill, which is the shire-house and the county gaol; also a city and county hospital, a lofty market-house of free-stone, a freeschool founded by Edward VI. and several charitable foundations. The ancient dukes of Norfolk had a palace here, which is still in existence as a workhouse. Near this city are the ruins of the castle of Kett, the tanner, by whose rebellion, in the reign of Edward VI. the city was reduced to a ruinous state. Norwich has manufactures of crapes, bombazines, and stuffs of various kinds, which are still considerable, though somewhat declined, on account of the rivalship of the cotton branches. Houses in 1801 were 8763, inhabitants 36,854. It is 43 miles N. of Ipswich, and 108 N.E. of London. Lon. 1. 20 E. Lat. 52. 40 N.

NORWICH, a city of Connecticut, in New London county, with three churches. It is in three divisions, namely Chelsea, the Town, and Bean Hill. The executive courts of law are held at this place and New London alternately. Here are made paper of all kinds, stockings, buttons, stone and earthen ware, and all kinds of forge work. It is seated at the head of navigation on the Thames, 12 miles N. of New London. Lon. 72. 12 W. Lat. 41. 34 N.

NOSE. *s.* (nœre, nora, Saxon.) 1. The prominence on the face, which is the organ of scent, and the emunctory of the brain. See NARES (*Locke*). 2. The end of any thing (*Holder*). 3. Scent; sagacity (*Collier*). 4. *To lead by the* NOSE. To draw by force: as a bear by his ring. To lead blindly. 5. *To thrust one's* NOSE *into* the affairs of others. To be a busy body. 6. *To put one's* NOSE *out of* joint. To put one out in the affections of another.

To NOSE. *v. a.* (from the noun.) 1. To scent; to smell (*Shakspeare*). 2. To face; to oppose.

To NOSE. *v. n.* To look big; to bluster (*Shakspeare*).

NOSE-BAND, or MUSEROLE, that part of a headstall of a bridle that comes over a horse's nose.

NOSE-BLEED, in botany, a species of ACHILLEAS, which see.

NO'SEGAY. *s.* (*nose* and *gay*.) A posy; a bunch of flowers (*Pope*).

NO'SELESS. *a.* (from *nose*.) Wanting a nose; deprived of the nose (*Shakspeare*).

NO'SESMART. *s.* (*nose* and *smart*.) The herb cresses.

NO'SLE. *s.* (from *nose*.) The extremity of a thing: as, *the* nosle *of a pair of bellows*.

NOSOCOMIUM. (from νοσος, a disease, and κομεω, to take care of.) An infirmary, or hospital.

NOSOGRAPHY. (νοσος, a disease, and γραφη, writing.) Nosology, the doctrine of diseases. The term has been lately used by M. Pinel. See NOSOLOGY.

NOSOLOGY. (νοσος, a disease, and λογος, doctrine.) The doctrine of diseases, comprising that peculiar and important part of medicine which relates to their description and arrangement, as therapeutics relate to their treatment and mode of cure, and pharmacy to the preparation of materials by which the cure is to be effected.

Thus contemplated, nosology consists of two parts, medical language or technology, and method or classification.

MEDICAL TECHNOLOGY.

Under the article NOMENCLATURE, which is directed to a general view of the technical tongue of most of the sciences, we have observed that the language of medicine is at present in a very imperfect state, and that fewer attempts have been made to correct it and give it purity and precision, than have taken place, within the last half century, in almost all the other liberal arts and sciences. The evil has been felt and complained of by almost every practitioner; but the complaint has been still endured, and the evil been rather a growing than a diminishing one. In the last volume of the Transactions of the Medical Society of London, this subject has been amply brought before the public and discussed in an article contributed by Mr. Good; and a plan proposed for purifying and reforming the language now in use by a few easy and perspicuous changes, to which it seems capable of submitting without violence. And as this plan is altogether new, and appears to have met with general approbation, not only in our own country, but in several foreign nations, we shall copy its outline in as few words as we are able.

The sources, observes Mr. Good, of the impurity and perplexity of medical language may be contemplated under the following heads:—First, the intermixture of different tongues that have no family or dialectic union. Secondly, the want of a common principle in the origin or appropriation of terms. Thirdly, the introduction of a variety of useless synonyms, or the adoption of different words by different writers to express the same idea. Fourthly, imprecision in the use of the same terms. Fifthly, an unnecessary coinage of new terms upon a coinage of new systems.

Having discussed these points at full length, the author proceeds to offer his "hints" for such a general correction and improvement as may yet be introduced into medical language without violence or ostentation.

The first point, he observes, that seems to require attention is to discard all equivocal terms as much as possible; and, in cases where this cannot be done, to assign a fixed and individual sense to every term, and never to employ it in any other sense. Sauvages has set an admirable example of this rule in the synopsis prefixed to the different classes of his nosology: nor has less attention been shown to it by Dr. Willan in the correct definitions prefixed to his treatise on Cutaneous Diseases.

The next rule recommended is that of creating as few new words as possible; and, among those already in use, of confining ourselves to the same term to express the same idea, even where we have a choice of numerous synonyms.

A third direction is, that we limit our nomenclature as much as possible to one language alone. It has already appeared, says the author, that even the nosologies of most repute are a mass of mere gibberish, from their unclassical combination of different tongues that were never meant to coalesce. Of these different tongues there can be no great perplexity in determining which ought to have the preference. Among those of vernacular use there is no one that would be allowed such a precedency: and, were such a precedency admitted, there is no one in possession of names sufficient to distinguish of itself every disease of which a system of nosology is expected to treat. Dr. Macbride's system is a sufficient proof of the truth of this observation. His nomenclature aims at being English; yet the names under several of his orders consist entirely of exotic terms, and render most of them of Latin, Greek, and English, uncouthly mixed together for the sake of convenience, like foreigners from all countries at a Hamburgh hotel. The only languages therefore that remain to us are the Greek and Latin; and of these two there can be no difficulty in deciding in favour of the former, when we reflect that by far the greater part of our technology is already derived from it; and that it possesses a facility of combination to which the Latin has no pretensions.

Having thus determined, our next care should be to banish every Latin, as well as every Arabic, Spanish, Italian, and German word in favour of its Greek synonym, wherever such synonym can be fairly traced in the Greek writers. Hippocrates is the first author to whom the nosologist should have recourse for this purpose; and in his failure he may perhaps be best supplied from Asclepiades, Celsus, Cœlius Aurelianus, Galen, and Aetius, with an occasional glance at Aristotle as he proceeds, from whom he may frequently glean many a useful term. From these writers the selection should be ample; for a blank of nearly twelve centuries shortly afterwards ensues, in which it will be hardly possible to sift out a word in any degree worthy of preservation: the Arabic writers, who chiefly fill it, having added little, except in the case of small-pox, and a few cutaneous diseases, to the common stock of medical information, and having contented themselves with writing commentaries upon Hippocrates and Galen.

Descending to the fifteenth century, we may again enrich our vocabulary from a few of the writers who then flourished; and may continue to add to it from the most celebrated of their successors. The origin, indeed, of a variety of diseases unknown to the Greeks, such as small-pox, syphilis, sea-scurvy, rickets, together with a great increase and diversity in the families of others, as struma, and phthysis, will render such an addition absolutely necessary: and the works of Fracastoro, Baglivi, Sydenham, Boerhaave, Sauvages, Linnéus, and Cullen, may be successfully resorted to for the purpose. To Fracastoro we owe the term *syphilis*: to Baglivi we are indebted for *hysteria*, and many other convenient terms; to Boerhaave the general use of the terminal *itis*, as significative of inflammation. To Sauvages, more than to any other modern author whatever, we are indebted for a revival of a great variety of terms derived from the Greek physicians, which ought never to have become obsolete. Linnéus and Cullen have shown far less attachment to a Greek origin, and have been less select in their terms. Yet the former may be said to have given us *atecnia* for *impotence*, a term unquestionably preferable to *anaphrodisia*; and the latter to have naturalized, though he did not invent, *pyrexia*, an elegant and expressive compound, very inadequately expressed by πυρετιον, πυρετος συνεχης, πυρετος συνετικος, or as they are spelled in Hippocrates, who wrote in the Ionic dialect, ξυνεχης and ξυνετικος, or indeed any similar phrasing of the Greek writers. Linnéus and Cullen, however, and especially the latter, have great merit as expurgators and proscribers of a vast mass of absurd and useless terms.

The name of Sydenham ought never to be mentioned but with gratitude: he was truly the Hippocrates of his age; yet he has little pretensions to the character of a nomenclator; having rather confined himself to the more important part of marking and describing than of naming diseases; and even in the latter case he has generally preferred a Latin derivation. His *nova febris* has been exchanged with the consent of every one for the *miliaris* of the authors of the Journal de Medicine.

From a few other writers, and especially the monogrammists, something may also be gleaned occasionally worthy acceptance. *Nostalgia* is a word of Neuter's invention, and intended to put to flight the *pothopatridalgia* of Zuinger, in which, to the consolation of every man's lips and ears, it has very effectually succeeded. Morton, I believe, first appropriated the term *phthisis* to pulmonary consumption; and Dover *diabetes*, a word invented by Aretæus, to the disease now known by this name, but for which Galen used *dipsacus*. *Scorbutus* we have received from Germany, principally through Hoffman and Boerhaave; and however objectionable its source, it has been too long naturalized to be exchanged for any other term. To whom we are indebted for *scrofula* I know not: Sauvages gives a reference to Allen; but it was certainly in use long before Allen's time. *Struma*, as employed by Celsus, seems to be a preferable term, and is continued by Linnéus. *Variola*, *varicella*, and *rubeola*, are upon the whole approved of. *Trichoma* is the invention of Jachius, a term strictly classical, and in every respect superior to the *plica polonica* of Starnigel, or the *plica Belgarum* of Schenck.

The Greek terms we are in possession of have chiefly reached us through the medium of Latin authors or translators; and hence they are generally characterized by a latinized complexion, and especially in their terminations. A rule being thus established, it should be adhered to in future: and even the existing exceptions be made to comply with it, wherever this can be accomplished gracefully and without constraint. Every one writes *typhus* and *synochus*, instead of *tuphos* and *sunochos*,

which are the Greek words; *parorchydium* instead of *parorchudion*. But if this orthography be correct, the *syrigmos* of Sagar and Linnéus should be *syrigmus*; the *causos* of Vogel (if retained at all), *causus*, while his *puosuria* should be *pyosuria*, or rather *pyuria*, which is a more common and a far better compound. In like manner we write *paralysis*, instead of *påralusis*, and *lyssa*, instead of *lussa*, wherever it is employed, as I think it ought always to be in the place of *hydrophobia*, a term very unnecessarily invented by Cœlius Aurelianus, and by no means pathagnomonic of the disease it is now generally made use of to signify, since the symptom it indicates is sometimes a concomitant of other diseases, and sometimes absent from that to which it gives a name. But if *lyssa* and *paralysis* be the proper mode of spelling, then *lues* and *lume*, which are equally derivatives from λυω, *solvo*, *dissolvo*, are strictly speaking improper, and ought from the first to have been written analogously *lyes* and *lyme*. Custom, however, has so long sanctioned the use of *luos* that I dare not recommend it to be changed; yet the point is of little consequence, as this term has been long sinking under the more common term of syphilis.

The rule of most importance however, and what, indeed, appears absolutely necessary to a due simplicity and precision in our nomenclature, is that we pay a scrupulous attention to the sense in which we employ the affixed and suffixed particles (sometimes prepositions, but not always so), which are used in compound terms to express the peculiar quality of the disease denoted by the theme or radical. Nothing can equal the perplexity which at present exists in medical language, or the difficulty which a student, and especially an unlettered student, lies under from a nonobservance of this rule.

The preposition *para* (παρα) is used in such a variety of senses, as, instead of guiding the judgement, it is perpetually leading it astray. The particle *a* (α) is subject to the same observation; being sometimes employed as a negative, to indicate total privation, and sometimes confounded with *dys* (δυς) merely to imply morbid or defective action: while, as though to make the balance even, *dys*, which is commonly used to express morbid or defective action alone, is at times also confounded with *a*, to signify total privation. Thus *dys*-menorrhœa, which is often restricted to difficult menstruation, or menstruation accompanied with pain and other morbid symptoms, signifies, in Sagar and Linnéus, suppressed catamenia, the amenorrhœa of Vogel and Cullen; while in the Cullenian system, the first order of the class *locales* confounds α, παρα, and δυς, by using them both synonymously, and in the same latitude of senses.

Algia is a termination frequently and elegantly employed to express pain; but the Greeks had, also, other words by which to denote the same feeling: and hence, unfortunately, our nosologists, in a morbid hunt after variety, have clogged the language of medicine with such terminations as *copus* (κοπος), *odyne* (οδυνη), and often *agra* (αγρα): when, to his utter confusion, the student not unfrequently meets with such synonyms as *ostalgia*, *ostocopus*, *ostodyne*, perplexingly and uselessly varied to denote the same common idea of *bone-ach*. In like manner *cephal-algia* is made use of to import head-ach, *gastr-odynia*, belly-ach, *pudend-agra* (Lin. iv. i. 58), painful sores in the pudendum, and *oneir-odynia*, night-mare, or sleep-walking, in which οδυνη appears to be used without any determinate sense.

Itis, in the same manner, is often employed at the close of words as significant of local inflammation. I do not profess to know very exactly the derivation of this term, nor have the etymologists attempted it for us. Probably it is ιεμαι, which in the Iliad means *impetu feror*, and if so it is radically appropriate; but it is to Boerhaave, as I have already observed, that we are indebted for the first general use of it in this peculiar sense, and a sense which is now approved and adopted by every one. Yet if *itis* be thus appropriated, it is impossible not to condemn such terms as *rachitis*, and *hydrorachtiis*, *ascites*, and *tympanites*, which have no reference whatever to local inflammation; or *arthritis* in Linnéus's nosology, which has nearly as little; the local inflammations being in this system enumerated under class iii. or *phlogistici*, while arthritis occurs under class iv. or *dolorosi*. It is farther to be observed, on the contrary, that in all the nosologies we meet with a great variety of local inflammations unindicated in the words selected to express them by any such termination as *itis*, and evincing almost every anomaly of termination, as *ophthalmia*, *cynanche*, *pneumonia*, *podagra*, all which occur in Dr. Cullen's class i. or pyrexiæ, order phlegmasiæ.

Rhœa and *rhagia* are terminations capable, perhaps, of admitting an easy distinction, but which have often been used indiscriminately. Both these, indeed, are employed, with a single exception, to import a preternatural flux of some kind or other; but *rhagia*, which ought to be regarded as an elision of *hæmor-rhagia*, is usually, and ought always to be, limited to a preternatural flux *of blood*, as in *rhinor-rhagia* (epistaxis), *enter-rhagia* (blood from the intestinal canal), and *menor-rhagia*; while *rhœa* is fairly applicable to a preternatural flux of any other sort, as *otor-rhœa*, *gonor-rhœa*, *leucor-rhœa*, *diar-rhœa*, and *perir-rhœa*, a term employed by Hippocrates in the sense of *enuresis*. The single exception alluded to is *menorrhœa*, which imports a natural flux, and in a healthy proportion; and to avoid the anomoly resulting from this single exception, Mr. Good advises to exchange the term for its synonym *catamenia*, or rather for *menia* alone, without the preposition, which is altogether superfluous, and is already omitted in all the compounds of μην, as also in the Latin homonyms, *menses* and *menstruatio*.

Dia (δια) is employed with meanings somewhat different, but possessing in every instance a shade of resemblance, and always involving the idea of separation; as in *dia-betes* and *diar-rhœa*, passing or flowing through; *dia-crisis* and *dia-gnosis*, judgment or distinction by the separation of symptom from symptom; *dia-stole*, *dia-stesis*, dilatation, or the separation of part from part.

To reduce, then, the anomalies thus pointed out to some degree of regularity, to make them intelligible to the student, and practically useful to the adept, Mr. Good concludes with submitting the following regulations.

1. Let the particle *a* (α) express alone the idea of total privation; as in *amentia*, *agalactia*, *amenorrhœa*.

2. Let *dys* (δυς) express alone the idea of deficiency, as its origin, δυω or δυμι, most naturally imports, and as we find it employed to express in *dys-pnœa*, *dys-cinesia*, and *dys-phagia*.

3. As an opposite to *dys*, let *en* (εν) be employed

as an augmentive particle, as we have it in *en-harmonia*, *en-telechia*, and *en-ergetic*. *En* is not often i[illegible]ed a medical compound, nor do I recollect its being employed in more than two instances; *encephalon*, in which it has the sense of *interior*, a word indeed that has been long falling into disuse; and *enuresis*, in which it imports excess, and is consequently used as now recommended. Thus restricted, εν and δυς will have the force of ὑπερ and κατα, but will be far more manageable in the formation of compounds.

4. Let *agra* (αγρα) be restrained to express the idea of simple morbid affection in an organ, synonymously with the Latin *passio*, or the *berh* of the Arabians.

5. Let *itis* (ιτις) express alone the idea of inflammatory action, as in *cephalitis*, *gastritis*, *nephritis*.

6. Let *algia* (αλγια) express alone the idea of pain or ach, to the banishment of such useless synonyms as *odyne* and *copos* or *copus*.

7. Let *rhagia* (from ῥησσω, *rumpo*) be confined to express a preternatural flux of blood.

8. Let *rhœa* (from ῥεω, *fluo*) express a preternatural flux of any other kind.

By adopting these few regulations, which, instead of innovating, only aim at reforming, our technology, if I mistake not, observes the author, would be in many respects equally improved in simplicity, in elegance, and in precision; the student would easily commit it to memory, and the practitioner have a real meaning in the terms he makes use of. To prove the truth of these assertions the subjoined table will be sufficient, which may be easily extended to any length by the use of other particles or prepositions, or the introduction of other themes or radical terms of the medical vocabulary; which, when thus simplified and cleared of the numerous synonyms and equivalents that at present overload it, might be reduced to, at least, a third part of its present length, and be rendered as much more perspicuous as it would be more concise.

NOSOLOGY.

RADICAL.	COMPOUNDS.							
	a.	dys.	en.	agra.	algia.	itis.	rhæa.	rhagia.
Men. Menses.	*Amenia.* Suppressed menstruation. Amenorrhæa, *Vog. Cul* Dysmenorrhæa, *Sag. Lin*	*Dysmenia.* Deficient menstruation. Dysmenorrhæa, *Vog.*	*Emmenia.* Immoderate menstruation. Menorrhæa. Immodica, *Sauv.* Catameniorum. Fluxus, *Hp. Fæsl.*	*Menagra* Morbid menstruation, generally.	*Menalgia.* Painful or difficult menstruation. Dysmenorrhæa, *Aut. Var.*		*Menorrhæa.* Whites. Leucorrhæa, *Sauv.* Menorrhæa alba, *Cul.* Fluor albus, *Alior. Aut.*	*Menorrhagia.* Uterine hæmorrhage. Menorrhagia rubra, *Cul.* Hæmorrhagia uterina, *Morton.*
Cephale. The head.	*Acephalia.* Headless. Monsters thus born.		*Encephalia.* Morbid enlargement of the head. Encephalocele, *Sauv.* Hernie du cerveau, *Le Dran*	*Cephalagra.* Morbid affection of the head, generally. Cephalæa, *Sauv.*	*Cephalalgia.* Head-ach. Cephalalgia, *Sauv. & Cul* Explexis, *Hippocr.* Capipleatum, *Baglivi.*	*Cephalitis.* Inflammation of the brain Cephalitis, *Sauv.* Siriasis, *Hippocr.* Apoplexia purulenta, *Morgagni.* Inflammation de cerveau, *De Mez.*		
Limos. Appetite. The digestive function.	*Alimia.* Total loss of appetite. Anorexia, *Cul.*	*Dyslimia.* Depraved digestion. Dyspepsia, *Cul.* Apepsia, *Vog.*	*Elimia.* Canine appetite. Bulimia, *Sauv.* Adephagia, *Vog.* Cynorexia, *Al.*	*Limagra.* Morbid or false appetite. Pica, *Sauv. Sag.* Citta, *Lin.* Allotrophagia, *Vog.* Malaccia.				
Gaster. The stomach. The digestive organ.	*Agastria.* Stomachless. Monsters thus born.	*Dysgastria.* Contracted stomach.	*Engastria.* Stomach morbidly or preternaturally enlarged. Gastrocele, *Sauv.*	*Gastragra.* Morbid affection of the stomach generally.	*Gastralgia.* Stomach-ach. Gastrodynia, *Sauv.*	*Gastritis.* Inflammation of the stomach. Gastritis, *Cul. Sauv*		*Gastrorrhagia.* Vomiting of blood from the stomach. Hæmatomesis.
Pneumon. The lungs.	*Apneumonia.* Lungless. Monsters thus born.	*Dyspneumonia.* Imperfect conformation of the lungs.		*Pneumonagra.* Morbid affection of the lungs, generally.	*Pneumonalgia.* Painful respiration. Orthopnœa. Dyspnœa. Anxietus.	*Pneumonitis.* Inflammation of the lungs. Pneumonia, *Cul.* Pulmonaria, *Alpini.*	*Pneumonorrhæa.* Purulent discharge from the lungs. Anacatharsis phthisica, *Sauv.* Vomica. Tupis purulenta.	*Pneumonorrhagia.* Discharge of blood from the lungs. Hæmorrhagia, *Vog.* Hæmoptoe.

NOSOLOGY.

RADICAL.	COMPOUNDS.							
	a.	dys.	en.	agra.	algia.	itis.	rhæa.	rhagia.
Entera. The intestines. The fecal organ.				Enter*agra.* Morbid affection of the canal, generally.	Enter*algia.* Colica, *Cul.* Flatulentia, *Sauv.*	Enter*itis.* Inflammation of the intestines. Enteritis, *Sauv. Cul Lin.* Intestinorum. Inflam. *Boerh.*		
Enteria. The fecal function.	*A*nenteria. Costiveness. Obstipatio, *Cul.*	*Dys*enteria. Feces, small in quantity, and discharged with violent straining. Dysenteria, *Aut.*	*En*enteria. Looseness. Diarrhœa. Passio cœliaca. Lienteria.				Enter*rhœa.* Purging and vomiting. Cholera, *Cul.* Diarrhœa cholerica Cholera Morbus	Enter*rhagia.* Intestinal discharge of blood. Profusio, *Lin.* Hæmorrhagia, *Vog. Boerh.* Melæna.
Ouron. Urine.	*A*nuria. Suppression of urine. Ischuria, *Cul. Sauv. Nal.*	*Dys*uria. Difficult discharge of urine. Dysuria, *Cul. Sauv. Lin.* Stranguria *Aliot.*	*En*uria. Involuntary flux of urine. Enuresis, *Sauv. Lin. Cul.* Paresis aretæus.	Ur*agra.* Morbid flux of urine, generally.			Urir*rhœa.* Purulent urine. Pyuria, *Sauv.*	Urir*rhagia.* Bloody urine. Hæmaturia, *Sauv. Cul.*
Ops. Opos. The sight. The sense of vision.	*A*nopia. Sightless. Caligo, *Sauv. Vog.* Cataracta, *Lin.* Amaurosis, *Vog. Sag.*	*Dys*opia. Weakness of sight. Dysopia, *Cul.* Amblyopia, *Sauv. Sag.*	*En*opia. Sight morbidly acute. Oenopia, } *Aut.* Oxyopia, } *Græc* Visus acrior, *Darwin.*	Op*agra.* Depraved sight, generally. Myopia. Presbytia. Pseudoblepsis.				

RADICAL.	COMPOUNDS.							
	a.	dys.	en.	agra.	algia.	itis.	rhæa.	rhagia.
Ophthalmos. The eye. The organ of vision	*Anophthalmia.* Eyeless.	*Dys*ophthalmia. Contracted or pig-eye.	*En*ophthalmia. Protuberant eye-ball. Prolapsus oculi. Buphthalmia, } *Aut.* Ecpiesmus, } *Gr.* Staphyloma.	Ophthalm*agra*. Morbid affection of the eye-ball, generally.	Ophthalm*algia*. Ache of the eye-ball.	Ophthalm*itis*. Inflammation of the eye-ball.	Ophthalm*rrhæa*. Flux of the lachrymal humour. Epiphora, *Sauv.* *Cul. Lin.*	
Otis. The ear. The organ of hearing.	*Anotia.* Earless.	*Dys*otia. Having the ears preternaturally small or defective.	*En*otia. Long ears. Ass's ears. Proptoma auricularum, *Sauv.* A monstrosity common to the Siamese.	Ot*agra*. Morbid affection of the ears, generally.	Ot*algia*. Ear-ach. Otalgia, *Sauv.*	Ot*itis*. Inflammation of the ear. Otitis, *Vog.*	Otir*rhœa*. Morbid discharge from the ear.	
Acoes. Hearing. The sense of hearing.	*Anacusia.* Deafness. Cophosis, *Sauv.* Dyscœa, *Cul.* Surditas *Aut. Lat.*	*Dys*acusia. Difficulty or hardness of hearing. Dyscœa, *Sauv.* Paracusis, *Cul.* Auditus difficilis, *Hoffman.*	*En*acusia. Hearing acutely strong. Oxycœa, *Sauv.* Auditus acrior, *Darwin.*	Acu*agra*. Morbid affection of hearing, generally. Paracol. *Hippocr.* Paracusis, *Sauv.*				
Pous. The foot. The common seat of the gout.				Pod*agra*. Gouty habit.	Pod*algia*. Chronic gout-pains.	Pod*itis*. Acute paroxysm of the gout.	Podo*rrhœa*. Gouty discharge.	

ARRANGEMENT OF DISEASES.

Upon this branch of nosology we have touched at some length in the article MEDICINE, and we shall therefore only add, in the present place, a few supplementary observations, which would have led us too far from the general scope of the article, had we indulged in them at that time.

The great advantage of arrangement or classification in the doctrine of diseases is distinction, and the facility it affords of contemplating groups of diseases under one common view. This last is an advantage, however, which applies chiefly to a natural arrangement; and it is remarkable that scarcely any method hitherto proposed has been founded upon such a basis.

The first attempt at a classification of diseases was made by Sauvages. It was published in a more abridged form, in octavo, before that vast mass of medical erudition, his two quarto volumes, was completed. It was first styled *Pathologia*, and the name was changed to prevent its being confounded with a branch of the institutions of medicine. His first class, *vitia*, import slight cutaneous diseases, or such as require chirurgical assistance: the three next, *fibres*, *phlegmasiæ*, and *spasmi*, need no particular notice in this place, as we have given the orders, as well as the classes, in the article MEDICINE. *Anhelationes*, the fifth class, import diseases of difficult respiration; the remaining five are *debilitates*, *dolores*, *vesaniæ*, *fluxus*, and *cachexiæ*.

Linnéus applied to the same purpose all his comprehensive accuracy, with a peculiar quaintness of language. The *exanthemati* are eruptive; the *critici*, common fevers; and the *phlogistici*, fevers attended with inflammation. The *dolorosi* are painful diseases; *mentales*, those productive of an abolition of judgment; *quietales*, those productive of an abolition of motion; *motorii*, import involuntary motions; *suppressorii*, obstructions of the natural passages; *evacuatorii*, morbid evacuations. The *deformes* are changes in the solids; and the *vitia* those of the surface.

Vogel's classification appeared in 1764: his *epischyses* import suppressions; his *adynamiæ*, debilities; his *hyperæstheses*, sensations, depraved or acute: his *paranoiæ*, aberrations of mind; his *vitia*, superficial, and *deformitates*, more solid deformities. For the remainder the reader may turn to the article MEDICINE; as he may also for the arrangement of Sagar, which was published in 1776, and whose names do not require any particular remark or explanation. We may extend this observation to the system of Dr. Darwin; and have given that of Dr. Cullen at such full length, as to render it unnecessary to return to it in this article.

The last general work on this subject is the Philosophical Nosography of Pinel, differing little in its outline from the common systems; but possessing too great refinement, and perhaps a useless minuteness in the subdivisions. The classes are *fevers*, *inflammations*, *active hæmorrhages*, *neurotics*, *lymphatic* diseases, and an appendix or indeterminate class, comprising the *jaundice* of new-born children, *diabetes*, *worms*, the *bites* of insects and serpents. It is not necessary to point out the imperfections of this method; it is not however one of the least that often the general, frequently the subordinate, divisions rest on the uncertain foundation of a theory; and a theory too very far from being universally admitted.

M. Selle's is a more limited system; whose Rudimenta Pyretologiæ Methodicæ was the subject of his thesis, and republished at Halle, in 1770, under the title of the Methodi Febrium Naturali Rudimenta, and afterwards in a more extensive form, under the first title, at Berlin, in 1786. To the last edition he introduced an attempt at a natural arrangement; and the classes are, *inflammatory diseases*, *putrid*, *bilious*, *pituitous*, *wormy*, *milky*, *nervous*, *periodical obstructions*, *gouty*, *rickety*, *scrophulous*, *cancerous*, *venereal*, *scabious*, *scorbutic*, *poisonous*, and *organic*. This is evidently, however, a mere outline, for the genera are not filled in; and it is obvious that they depend almost exclusively on causes, and are consequently theoretical. They approach nearly, in the manner of their formation, the natural orders of plants by Jussieu.

These are the chief systems founded, or pretended to be founded, on symptoms. If we were to examine each minutely, it would appear that, except in those of Linnéus and Cullen, there is no arrangement of classes, no traces of what constitutes a regular method. The method of Linnéus is somewhat fanciful; that of Cullen, into universal and local diseases, injurious. In all, the fundamental error appears of forming classes without having ascertained species; so that in reality the classes are orders, and the orders in general claim no higher rank than the first associations of species, *genera*. In general we may remark, that there are some associations so obvious, that they at once seize the attention of every nosologist, for no one thinks of separating fevers or inflammations; nor, except Dr. Cullen, the passive hæmorrhages and profluvia from the active. Each slides into each other by such insensible shades, that we know not where the one begins and the other ends. There is also usually a great error in the definitions: the symptoms are seldom scientifically arranged, so as to facilitate investigation. In botany, either the character of the sections, or the first part of the character, at once informs the student whether the plant belongs to that species, or to one far below. The nosologists have collected their symptoms with little care; and in their anxiety to distinguish diseases, have nearly rendered their definitions descriptions. This is particularly the error of Vogel and Sagar. To render their works also complete, they have included the minutest deviations from the natural appearance, forgetting that it was an arrangement of diseases, the essence of which consists in injured functions.

NOSOPOIETICS. (from νοσος, a disease, and ποιεω, to induce). Whatever injures the health, and induces disease.

NOSTALGIA. (*nostalgia*, νοσταλγια; from νοστεω, to return, and ἀλγος, pain.) A vehement desire of revisiting one's home or country. A genus of disease in the class locales and order dysorexiæ of Cullen, known by impatience when absent from such places, an earnest wish to return, attended with gloom and melancholy, loss of appetite, and want of sleep.

NOSTRADAMUS (Michael), a French astrologer and physician, was born in Provence in 1503. He took his degree of doctor of physic at Montpellier, in 1529; and in 1546 went to Aix, at the solicitation of the inhabitants, the place then being greatly afflicted with the plague; and for his services on that occasion he received a considerable pension for many years. In 1555 he published his quatrains of prophecies, which excited considerable notice,

and though many looked upon him as a visionary, there were more who regarded him as a conjuror. He was well received at court, and under the royal patronage published an enlarged edition of his work. He died in 1566, leaving three sons and three daughters.

Besides his Centuries, we have the following compositions of his: a treatise de fardemens et de senteurs, 1552; a book of singular receipts, pour entretenir la santé du corps, 1556; a piece des confitures, 1557; a French translation of the Latin of Galen's paraphrase, exhorting Menedolus to study, especially to that of physic, 1552. Some years before his death, he published a small instruction for husbandmen, showing the best seasons for their several labours, which he intitled, The Almanac of Nostrodamus. Lastly, after his death there came out the eleventh and twelfth Centuries of his Quatrains, added to the former ten, which had been printed three times in two separate parts. It is only in these first editions that our author's Centuries are found without alterations, additions, &c. It is to this work that the following distich of Stephen Jodelle alludes.

Nostra damus cum falsa damus, nam fallere nostrum est.
Et cum falsa damus, nil nisi Nostra damus.

NO'STRIL. *s.* (*nose* and ðyꝛl, a hole, Saxon.) The cavity in the nose (*Bacon*).

NO'STRUM. *s.* (Latin.) A medicine not made public, but remaining in some single hand (*Stillingfleet*).

NOT. *ad.* (ne auht, Saxon; *niet*, Dutch.) 1. The particle of negation, or refusal. 2. It denotes cessation or extinction. No more (*Job*).

NO'TABLE. *a.* (*notable*, Fr. *notabilis*, Lat.) 1. Remarkable; memorable; observable (*Sidney*). 2. Careful; bustling (*Addison*).

NO'TABLENESS. *s.* (from *notable.*) Appearance of business; importance.

NO'TABLY. *ad.* (from *notable.*) 1. Memorably; remarkably (*Bacon*). 2. With consequence; with show of importance (*Addison*).

NOTÆ, signs used in writing, which have the force of many letters. This contrivance for expedition is of great antiquity. It was known to the Greeks, and from them derived to the Romans. By whom the invention was brought into Rome is not precisely ascertained; but the most general opinion is, that in matters of importance Tully first made use of notes or short-hand writing, when Cato made an oration in order to oppose Julius Cæsar relative to the conspiracy of Catiline. Cicero, who was at that time consul, placed *notarii*, or expert short-hand writers, in different parts of the senate-house, to take down the speech; and this was the first public occasion which we find recorded of employing short-hand writers among the Romans. It is unnecessary to observe, that hence proceeded the name of notary, still in use.

There were three kinds of notes for short-hand writing used by the ancients, either for dispatch or secresy. The first and most ancient was that of hieroglyphics, which are rather images or representations of things than of words. (See Hieroglyphics.) The Chinese characters are of this kind, and may with greater propriety be called *notæ* than *litteræ*, as appears from what hath been already advanced. The second species of notes were called *singulariæ*, from their expressing words by single letters. Sertorius Ursatus has compiled a very copious collection of such abbreviations, of which work there are several editions. The third kind of notes were called *notæ Tironianæ*, from Tiro the freed-man of Cicero, who was excellently skilled in this art; and it is to him that we are indebted for the preservation of Cicero's letters, of which a great part still remain, and one entire book of them written to Tiro himself.

NOTA'RIAL. *a.* (from *notary.*) Taken by a notary (*Ayliffe*).

NOTARY (*notarius*), signifies a person, usually some scrivener, who takes notes, or frames short draughts, of contracts, obligations, charter-parties, or other writings. At present we call him a notary-public, who publicly attests deeds or writings, in order to make them authentic in another nation: but he is principally employed in business concerning merchants; as making protests of bills of exchange, &c. And noting a bill, is where he goes to take notice of a merchant's refusal to accept or pay the same.

NOTA'TION. *s.* (*notatio*, Latin.) 1. The act or practice of recording any thing by marks; as by figures or letters (*Cocker*). 2. Meaning; signification (*Hammond*).

Notation, in music. See Music.

Notation, in arithmetic, is the representing of numbers, or any other quantities, by notes, characters, or marks.

The choice of arithmetical, and other, characters, is arbitrary; and hence they are various in various nations: the figures 0, 1, 2, 3, &c. in common use, are derived from the Arabs and Indians, from whom they have their name, and the notation by them, which forms the decimal or decuple scale, is perhaps the most convenient of any for arithmetical computations.

The Greeks, Hebrews, and other eastern nations, as also the Romans, expressed numbers by the letters of their common alphabet. See Character.

In algebra, the quantities are represented mostly by the letters of the alphabet, &c.; and that as early as the time of Diophantus. See Algebra.

Notation (Scales of). See Scale.

NOTCH. *s.* (*nocchia*, Italian.) A nick; a hollow cut in any thing; a nock (*Grew*).

To Notch. *v. a.* (from the noun.) To cut in small hollows (*Grew*).

NOTCHED LEAF. See Crenate.

NOTCHWEED, in botany. See Urtica.

NOTE. (for *ne mote.*) May not (*Spenser*).

Note. *s.* (*nota*, Latin; *note*, French.) 1.

Mark; token (*Hooker*). 2. Notice; heed (*Shakspeare*). 3. Reputation; consequence (*Abbot*). 4. Reproach; stigma (*Shakspeare*). 5. Account; information: not used (*Shaks.*). 6. State of being observed (*Bacon*). 7. Tune; voice; harmonic or melodious sound (*Hooker*). 8. Single sound in music (*Dryden*). See MUSIC. 9. Short hint; small paper (*Shaks.*). 10. Abbreviation; symbol (*Baker*). 11. A small letter (*Dryden*). 12. A written paper (*Swift*). 13. A paper given in confession of a debt (*Arbuthnot*). 14. Explanatory annotation (*Felton*).

To NOTE. *v. a.* (*noto*, Latin; *noter*, French.) 1. To observe; to remark; to heed; to attend; to take notice of (*Addison*). 2. To deliver; to set down (*Hooker*). 3. To charge with a crime (*Dryden*). 4. (In music.) To set down the notes of a tune.

NOTEBURG, a town of Russia, in the government of Petersburg, seated on an island in the lake Ladoga, at the place where the Neva issues. It has a good citadel, and was capital of Ingria, before Petersburg was built. It is 25 miles E. of Petersburg. Lon. 31. 9 E. Lat. 59. 56 N.

NO'TEBOOK. *s.* (*note* and *book.*) A book in which notes and memorandums are set down (*Shakspeare*).

NO'TED. *part. a.* (from *note.*) Remarkable; eminent; celebrated (*Boyle*).

NO'TER. *s.* (from *note.*) He who takes notice.

NO'THING. *s.* (*no* and *thing.*) 1. Negation of being; nonentity; universal negation: opposed to *something* (*Bentley*). 2. Nonexistence (*Shakspeare*). 3. Not any thing; no particular thing (*Addison*). 4. No other thing (*Wake*). 5. No quantity or degree (*Clarendon*). 6. No importance; no use (*Spenser*). 7. No possession of fortune (*Shakspeare*). 8. No difficulty; no trouble (*Ray*). 9. A thing of no proportion (*Bacon*). 10. Trifle; something of no consideration or importance (*Dryden*). 11. *Nothing* has a kind of adverbial signification. In no degree; not at all: as, *he was* nothing *moved* (*Knolles*).

NO'THINGNESS. *s.* (from *nothing.*) 1. Nihility; nonexistence (*Donne*). 2. Thing of no value (*Hudibras*).

NOTHUS, signifies spurious, or bastard; whence it is figuratively applied by physicians to such diseases as, though in respect of a similitude of symptoms, &c. they have the same denomination as some others, yet are of a different origin, seat, or the like, from the same.

NOTHUS, a Persian prince, and grandfather to Darius Codomannus. He is worthy of being mentioned only as he was progenitor to that sovereign whose overthrow conferred upon Alexander the title of Great.

NO'TICE. *s.* (*notice*, French; *notitia*, Latin.) 1. Remark; heed; observation; regard (*Locke*). 2. Information; intelligence (*Shakspeare*).

NOTIFICA'TION. *s.* (*notification*, Fr. from *notify.*) Act of making known; representation by marks or symbols (*Holder*).

To NO'TIFY. *v. a.* (*notifier*, Fr. *notifico*, Lat.) To declare; to make known (*Whitgift*).

NOTION, a word which in common language is considered as of the same import with idea. This, however, is improper. Notion comprehends the meaning of idea, but it denotes much more. We have a notion of spirit, of power, of solidity; but of these things we can have no ideas. Ideas are relicts of sensation; but there are objects of knowledge which fall under the cognizance of no sense; of these objects, however, we may have very distinct notions either direct or relative.

NO'TIONAL. *a.* (from *notion.*) 1. Imaginary; ideal; intellectual (*Prior*). 2. Dealing in ideas, not realities (*Glanville*).

NOTIONA'LITY. *s.* (from *notional.*) Empty, ungrounded opinion: not used (*Glan.*).

NO'TIONALLY. *ad.* (from *notional.*) In idea; mentally (*Norris*).

NOTITIA, in literary history, a book that gives an account of a particular country, city, or other place: such is the Notitia Imperii Romani, Notitia Romæ Antiquæ, &c.

NOTO, a town of Sicily, capital of Val di Noto. It was ruined by an earthquake in 1693, and near it another town was built called Noto Nuovo. It is 22 miles S.W. of Syracuse. Lon. 15. 19 E. Lat. 36. 50 N.

NOTONECTA. Boat-fly. In zoology, a genus of the class insecta, order hemiptera. Snout inflected: antennas shorter than the thorax; wings four, folded crosswise, coriaceous on the upper half: hind legs hairy, formed for swimming. The insects of this genus, like those of the genus nepa, live in stagnant waters, and prey on aquatic animalcules; the larves and pupes are six-footed and active; the former have the rudiments of wings, the others not. Seventeen species, arranged under the two following sections.

A. Lip elongated, conic, including thirteen species.

B. Sheath conic, spinous at the sides; four species; comprising the sigara of Fabricius.

These insects chiefly inhabit Europe: one or two are found in India and South America. Three are common to our own country.

1. N. glauca: grey boat-fly.
2. N. striata: striated boat-fly.
3. N. minutissima: small boat-fly.

The first is of a pale colour, mixed with black, and is very common upon stagnated water; the head is round, and for the greatest part occupied by two large brown eyes; the antennas very small, of a yellow colour, and inserted in the under part of the head; the elytra or sheaths of a rusty cloud colour, large, and crossed one over the other.

The second species also frequents the water, is much smaller than the former, and emits a disagreeable odour. The elytra are pale, striated with a number of undulating transverse lines. Its shape is oblong; the forehead and feet of a golden yellow; the thorax brown.

The third notonecta is of a size scarcely perceptible; and, according to the Swedish naturalist, has neither wings nor elytra. The

whole insect does not appear larger than a small grain of sand, and is of a brown colour, transversely striated.

The notonectæ have obtained their name from the singular manner in which they swim on the back, presenting the belly uppermost. This situation seems admirably fitted for the creature's manner of feeding, which is said to be on the under side of plants that grow on the surface of the water; for the animal, by having its mouth thus turned upwards, is capable of taking its food with great convenience: nor are its motions in the least impeded by this apparently awkward posture; on the contrary, it is very nimble, diving down instantaneously when it perceives danger, and rising again to the surface, the two hind legs all the while serving for paddles.

NOTORI'ETY. *s* (*notorieté*, Fr.) Public knowledge; public exposure (*Addison*).

NOTO'RIOUS. *a.* (*notorius*, Lat. *notoire*, Fr.) Publicly known; evident to the world; apparent; not hidden (*Whitgift*).

NOTO'RIOUSLY. *ad.* (from *notorious.*) Publicly; evidently; openly (*Clarendon*).

NOTO'RIOUSNESS. *s.* (from *notorious.*) Public fame; notoriety.

NOTOXUS, in zoology, a genus of the class insecta, order coleoptera. Antennæ filiform; feelers four, hatchet-shaped; jaw one-toothed; thorax a little narrowed behind. Thirteen species scattered over the globe, of which four are common to our own country, generally found on umbelliferous plants.

To NOTT. *v. a.* To shear (*Ainsworth*).

NOTTINGHAM, a borough and the capital of Nottinghamshire, governed by a mayor, with a market on Wednesday and Saturday. It is situate on the side and summit of a rock, into which are cut some small habitations, and numerous vaults or cellars. To the west of the town, on a rocky eminence, is the castle, a magnificent modern structure, belonging to the duke of Newcastle, built on the site of an ancient fortress, celebrated in English history. It is a handsome town, distinguished by its spacious market-place, and noted for its excellent ale. In 1801 it contained 28,861 inhabitants. It is one of the principal seats of the stocking manufacture, particularly of the finer kinds, as those of silk and cotton; and has also a manufacture of coarse earthen ware. The malting business is likewise considerable. It has three parish-churches, and many meeting-houses for dissenters. In the neighbourhood are many coalpits, which afford plenty of fuel, at little expence. At this town Charles I. set up his standard, at the commencement of the civil war, which terminated in his destruction. Nottingham is seated on a river, which communicates with the Trent, one mile to the south. It is 16 miles E. of Derby, and 124 N. by W. of London. Lon. 1. 2 W. Lat. 52. 58 N.

NOTTINGHAM, a town of Maryland, in Prince George county, situate on the Patuxent, 20 miles S.E. of Washington.

NOTTINGHAM, a town of New Hampshire, in Rockingham county, 14 miles N.N.W. of Exeter.

NOTTINGHAMSHIRE, a county of England, 48 miles long, and 20 broad; bounded on the N. by Yorkshire and Lincolnshire, E. by the latter county, S. by Leicestershire, and W. by Derbyshire. It contains 495,360 acres; is divided into eight hundreds, and 168 parishes; and has nine market-towns. The number of inhabitants in 1801 was 140,350: and it sends eight members to parliament. It enjoys such a temperature of soil and climate, as to render it one of the most fertile and pleasant counties in England. The principal rivers are the Trent and Idle. Almost the whole of the middle and western parts of the county were formerly occupied by the extensive forest of Sherwood, which is the only royal forest N. of the Trent; but the wood has in most parts been cleared, and the extent of the forest much contracted by enclosures. The chief products of this county are coal, of which there is great plenty; a kind of stone somewhat like alabaster, but not so hard, which, when burnt, makes a plaster exceedingly hard, and with this the inhabitants generally lay the floors of their upper rooms, instead of boarding them: its other commodities are malt, hops, wool, licorice, and woad. The manufactures chiefly consist of framework, knitting, glass, and earthenware.

NOTWHEAT. *s.* (*not* and *wheat.*) Of wheat there are two sorts; French, which is bearded, and *notwheat*, so termed because it is unbearded (*Carew*).

NOTWITHSTA'NDING. *conj.* (This word is properly a participial adjective, as it is compounded of *not* and *withstanding*, and answers exactly to the Latin *non obstante.*) 1. Without hinderance or obstruction from. 2. Although: not proper (*Addison*). 3. Nevertheless; however (*Hooker*).

NOTUS. *s.* (Latin.) The south wind.

NOVACULITE, in mineralogy, a species of ARDERIA, which see.

NOVARA, an ancient and strong town of Italy, in the duchy of Milan, capital of the Novarese, with a bishop's see. It is seated on an eminence, 12 miles N.E. of Verceil, and 25 W. by S. of Milan. Lon. 8. 35 E. Lat. 45. 25 N.

NOVA SCOTIA, or ARCADIA, a country of British North America, bounded on the W. by the United States, on the N. by the river St. Lawrence, on the E. by the gulf of that name, and on the S. by the Atlantic and bay of Fundy; being so indented by the latter, that its eastern part forms a peninsula. It extends from Cape Sable, its most southern point, in Lat. 43. 23 to 49. 30 N, and from 60. 15 to 67. 0 W. Lon. In 1784 part of this country was formed into a new province. (See NEW BRUNSWICK.) The atmosphere, for a great part of the year, is clouded with a thick fog, which renders it unhealthy; and, for four or five months, it is intensely cold. A great part of the country lies in forest; and the soil (except on the banks of the rivers) is thin and barren. Halifax is the capital.

Nova Zembla. See Zembla.

NOVATUS, a priest of the church of Carthage in the third century, and the author of a remarkable schism. He was a man of scandalous life, and to escape punishment entered into a cabal against St. Cyprian. He procured Novatian, a Roman priest, to be irregularly chosen bishop of Rome. These two heresiarchs broached a number of errors, particularly disallowing second marriages, and asserting the necessity of rebaptising those who fell into any grievous sin after baptism.

NOVATIAN, the person mentioned in the preceding article, who assumed to himself the title of bishop of Rome, though he had been illegally ordained priest. St. Jerome ascribes to him several treatises, which were well written.

Novatians, a Christian sect which sprang up in the third century, so called from Novatian, a priest of Rome, and Novatus, an African bishop, who separated from the communion of pope Cornelius, whom Novatian charged with a criminal lenity towards those who had apostatized during the persecution of Decius. He first denied the church's power of remitting mortal sins, upon the offender's repentance; but at last went so far as to deny that the apostates could ever hope for pardon even from God himself. Novatus coming to Rome, joined with the followers of Novatian, and added to these rigid doctrines another, which was the unlawfulness of second marriages, against which this became as severe as against apostates; denying communion to such as married a second time after baptism, and treating widows who married again as adulteresses. The two leaders were proscribed and declared heretics, not for excluding penitents from communion, but for denying that the church had the power of remitting sins.

NOVATION. *s.* (*novatio*, Latin.) The introduction of something new.

NOVATOR. *s.* (Latin.) The introducer of something new.

NOUE (Francis de la), a brave soldier under Henry IV. of France, who obtained a great reputation in several battles and sieges. He lost his life before Lamballe, and left behind him a volume of political and military essays, which have been often printed.

NOVEL, a fictitious narrative in prose, which professes to exhibit the natural workings of the human heart, the happiness and misery of private life, and, above all, the nature of the affection called love, and the consequence of indulging it in certain circumstances. The novel sprung out of the old romance, and has been censured for insipidity, as its parent was for extravagance. (See Romance.) That the greater part of those absurd things, which, under this title, are daily issuing from the press, deserve all the contempt with which they can be treated, is a position which we feel not ourselves inclined to controvert; but we cannot admit that any species of writing is in itself insipid, merely because numbers have attempted it without success. The heroic poems of Blackmore are universally known to be contemptible performances; and if we had before us all the heroic poetry that has ever been written, how many thousands of volumes should we have as mean as either Prince Arthur, King Arthur, Elize, or Alfred? Yet no critic has hitherto dared to maintain, that heroic poetry is an insipid species of writing.

But to the novel objections have been urged of more importance than its insipidity. It has been often affirmed that the perusal of novels tends to corrupt the youth of both sexes; to produce effeminacy in men and extravagant notions of the happiness of love in women; that it diverts the minds of the former from more serious and useful studies, and exposes the latter to the arts of seduction. That there are too many novels to which this objection is applicable in its full force is a fact which we are afraid cannot be denied: but when it is admitted, let not these performances be again accused of insipidity; for were they insipid, they could have no such consequences. It is by laying fast hold of the heart that they lead it astray. That a novel might be written so as to interest the heart in behalf of virtue, as much as any one has ever warped it to the side of vice, is a truth which no man will ever venture to call in question who has any knowledge of human nature; and therefore we are decidedly of opinion, that there may be novels worthy at once of the perusal of inexperienced youth and hoary wisdom. A critic, by no means too indulgent to works of fancy, and among whose failings laxity of morals has never been numbered, thus expresses himself on the subject of novel-writing:—"These familiar histories may perhaps be made of greater use than the solemnities of professed morality, and convey the knowledge of vice and virtue with more efficacy than axioms and definitions. But if the power of example is so great, as to take possession of the memory by a kind of violence, and produce effects almost without the intervention of the will, care ought to be taken, that, when the choice is unrestrained, the best examples only should be exhibited; and that what is likely to operate so strongly should not be mischievous or uncertain in its effects."

We have said, that the novel professes, above all things, to exhibit the nature of love and its consequences. Whether this be essential to such performances may perhaps be reasonably questioned: but it has been made an important part of the drama in most novels, and, we think, with great propriety. It is the object of the novelist to give a true picture of life, diversified only by accidents that daily happen in the world, and influenced by passions and qualities which are really to be found in conversing with mankind. To accomplish this object, he conceives a hero or heroine, whom he places in a certain rank of life, endues with certain qualities of body and mind, and conducts, through many vicissitudes of fortune, either to the summit of happiness or to the abyss of misery, according to the passion which he wishes to excite in his readers. In the no-

dern novel, this hero or heroine is never placed on a throne, or buried in a cottage; because to the monarch and the cottager no difficulties occur which can deeply interest the majority of readers. But among the virtuous part of the intermediate orders of society, that affection which we call love seldom fails, at some period of life, to take possession of the hearts of both sexes; and wherever it has place, it must be productive of happiness or of misery. In the proper management of this passion consists much of the difficulty of the novel-writer. He must exhibit his hero as feeling all the pangs and pleasures of love, as sometimes animated with hope, and sometimes ready to sink into despair, but always exerting himself to obtain the gratification of his wishes. In doing this, care should be taken, either that he never transgress the laws of virtue, or at least that he never transgress them with impunity.

"It is justly considered as the greatest excellency of art to imitate nature; but it is necessary to distinguish those parts of nature which are most proper for imitation: greater care is still required in representing life, which is so often discoloured by passion or deformed by wickedness. If the world be promiscuously described, I cannot perceive (says the great critic already quoted) of what use it can be to read the account; or why it may not be as safe to turn the eye immediately upon mankind, as upon a mirror which shows all that presents itself without discrimination. It is therefore not a sufficient vindication of a character, that it is drawn as it appears; for many characters ought never to be drawn: nor of a narrative, that the train of events is agreeable to observation; for that observation which is called knowledge of the world will be found much more frequently to make men cunning than good. The purpose of these writings is surely not only to show mankind, but to provide that they may be seen hereafter with less hazard; to teach the means of avoiding the snares which are laid by treachery for innocence, without insuring any wish for that superiority with which the betrayer flatters his vanity; to give the power of counteracting fraud, without the temptation to practise it; to initiate youth by meek encounters in the art of necessary defence; and to increase prudence without impairing virtue.

"Many writers, for the sake of following nature, so mingle good and bad qualities in their principal personages, that they are both equally conspicuous; and as we accompany them through their adventures with delight, and are led by degrees to interest ourselves in their favour, we lose the abhorrence of their faults, because they do not hinder our pleasures, or perhaps regard them with some kindness for being united with so much merit.—There have been men indeed splendidly wicked, whose endowments threw a brightness on their crimes, and whom scarce any villany made perfectly detestable, because they never could be wholly divested of their excellencies: but such have been in all ages the great corruptors of the world; and their resemblance ought no more to be preserved than the art of murdering without pain.

"In narratives where historical veracity has no place, there should be exhibited the most perfect idea of virtue; of virtue not angelical, nor above probability (for what we cannot credit we shall never imitate), but the highest and purest that humanity can reach, which exercised in such trials as the various revolutions of things shall bring upon it, may, by conquering some calamities and enduring others, teach us what we may hope, and what we can perform. Vice (for vice is necessary to be shown) should always disgust; nor should the graces of gaiety, or the dignity of courage, be so united with it as to reconcile it to the mind. Wherever it appears, it should raise hatred by the malignity of its practices, and contempt by the meanness of its stratagems: for while it is supported by either parts or spirit, it will seldom be heartily abhorred."

If these observations be just, and to us they appear unanswerable, Richardson's Lovelace is a character which ought never to have been drawn.

The business of the novelist is to interest the heart by a display of the incidents of common life. In doing this he must exhibit scenes that are probable, and record speeches that are natural. He is not at liberty to invent, but only to select objects, and to cull from the mass of mankind those individuals upon which the attention ought most to be employed. The more closely he adheres to this rule, the more deeply does he interest us in his narrative; because every reader sees at once that it is possible he may at some time or other be in circumstances nearly resembling those of the hero of the tale. But the business of life is not transacted in pompous language, nor the speeches of real lovers made in verse either rhimed or blank. Were Tom Jones or Clarissa Harlowe to be translated into verse, we shall venture to assert that they would quickly lose their hold of the public mind; because the hero and heroine would then appear in a light which every heart must feel to be unnatural.

It is well observed by Johnson, that the task of the novel-writer "requires, together with that learning which is to be gained from books, that experience which can never be attained by solitary diligence, but must arise from general converse and accurate observation of the living world. Their performances have, as Horace expresses it, *plus oneris quantum veniæ minus*, little indulgence, and therefore more difficulty. They are engaged in portraits of which every one knows the original, and can detect any deviation from exactness of resemblance. Other writings are safe, except from the malice of learning: but these are in danger from every common reader: as the slipper ill executed was censured by a shoemaker who happened to stop in his way at the Venus of Apelles." It is in thus faithfully copying nature that the excellence of Fielding consists. No man was ever better acquainted with the

shades which diversify characters, and none ever made his personages act and speak more like real men and women in the particular circumstances which he describes.

"But the fear of not being approved as a just copier of human manners, is not the most important concern that an author of this class ought to have before him. Novels are written chiefly to the young, the ignorant, and the idle, to whom they serve as lectures of conduct and introduction into life. In every such work it should therefore be carefully inculcated, that virtue is the highest proof of understanding, and the only solid basis of greatness; and that vice is the natural consequence of narrow thoughts; that it begins in mistake, and ends in ignominy: and since love must be introduced, it should be represented as leading to wretchedness, whenever it is separated from duty or from prudence."

Novel, in the civil law, a term used for the constitutions of several emperors, more particularly those of Justinian. They were called novels, either from their producing a great alteration in the face of the ancient law, or because they were made on new cases, and after the revisal of the ancient code.

No'vel. *a.* New.

NO'VELIST. *s.* (from *novel.*) 1. Innovator; assertor of novelty (*Bacon*). 2. A writer of novels.

NOVELLARA, a town of Italy, capital of a small district of the same name, with a castle, where the sovereign resides. It is 17 miles E. by N. of Parma, and 20 S. by W. of Mantua. Lon. 11. 4 E. Lat. 44. 48 N.

NO'VELTY. *s.* (*nouveauté*, French.) 1. Newness; state of being unknown to former times (*Hooker*). 2. Freshness; recentness (*South*).

The pleasure of novelty is easily distinguished from that of variety: to produce the latter, a plurality of objects is necessary; the former arises from a circumstance found in a single object. Again, where objects, whether coexistent or in succession, are sufficiently diversified, the pleasure of variety is complete, though every single object of the train be familiar; but the pleasure of novelty, directly opposite to familiarity, requires no diversification.

There are different degrees of novelty, and its effects are in proportion. The lowest degree is found in objects surveyed a second time after a long interval; and that in this case an object takes on some appearance of novelty, is certain from experience: a large building of many parts variously adorned, or an extensive field embellished with trees, lakes, temples, statues, and other ornaments, will appear new oftener than once: the memory of an object so complex is soon lost, of its parts at least, or of their arrangement. But experience teaches, that, even without any decay of remembrance, absence alone will give an air of novelty to a once familiar object; which is not surprising, because familiarity wears off gradually by absence: thus a person with whom we have been intimate, returning after a long interval, appears like a new acquaintance. And distance of place contributes to this appearance, not less than distance of time: a friend, for example, after a short absence in a remote country, has the same air of novelty as if he had returned after a longer interval from a place nearer home: the mind forms a connection between him and the remote country, and bestows upon him the singularity of the objects he has seen. For the same reason, when two things equally new and singular are presented, the spectator balances between them; but when told that one of them is the product of a distant quarter of the world, he no longer hesitates, but clings to it as the more singular: hence the preference given to foreign luxuries, and to foreign curiosities, which appear rare in proportion to their original distance.

The next degree of novelty, mounting upward, is found in objects of which we have some information at second hand; for description, though it contribute to familiarity, cannot altogether remove the appearance of novelty when the object itself is presented: the first sight of a lion occasions some wonder, after a thorough acquaintance with the correctest pictures and statues of that animal.

A new object that bears some distant resemblance to a known species, is an instance of a third degree of novelty: a strong resemblance among individuals of the same species prevents almost entirely the effect of novelty, unless distance of place or some other circumstance concur; but where the resemblance is faint, some degree of wonder is felt, and the emotion rises in proportion to the faintness of the resemblance.

The highest degree of wonder arises from unknown objects that have no analogy to any species we are acquainted with. Shakspeare in a simile introduces that species of novelty:

> As glorious to the sight
> As is a winged messenger from heaven
> Unto the white up-turned wond'ring eye
> Of mortals, that fall back to gaze on him
> When he bestrides the lazy-pacing clouds
> And sails upon the bosom of the air.
>
> *Romeo and Juliet.*

One example of that species of novelty deserves peculiar attention; and that is, when an object altogether new is seen by one person only, and but once. These circumstances heighten remarkably the emotion: the singularity of the spectator concurs with the singularity of the object to inflame wonder to its highest pitch.

In explaining the effects of novelty, the place a being occupies in the scale of existence is a circumstance that must not be omitted. Novelty in the individuals of a low class is perceived with indifference, or with a very slight emotion: thus a pebble, however singular in its appearance, scarce moves our wonder. The emotion rises with the rank of the objects; and, other circumstances being equal, is strongest in the highest order of existence; a strange

insect affects us more than a strange vegetable; and a strange quadruped more than a strange insect.

However natural novelty may be, it is a matter of experience, that those who relish it the most are careful to conceal its influence. Love of novelty, it is true, prevails in children, in idlers, and in men of shallow understanding: and yet, after all, why should one be ashamed of indulging a natural propensity? A distinction will afford a satisfactory answer. No man is ashamed of curiosity when it is indulged to acquire knowledge. But to prefer any thing merely because it is new, shows a mean taste which one ought to be ashamed of: vanity is commonly at the bottom, which leads those who are deficient in taste to prefer things odd, rare, or singular, in order to distinguish themselves from others. And in fact, that appetite as above-mentioned reigns chiefly among persons of a mean taste, who are ignorant of refined and elegant pleasures.

Of this taste we have some memorable instances in men of the highest and the best education. Lucian tells the following story of Ptolemy I. which is as disgraceful to him, as honourable to his subjects. This prince had ransacked the world for two curiosities: one was a camel from Bactria all over black; the other a man, half black half white. These he presented to the people in a public theatre, thinking they would give them as much satisfaction as they did him; but the black monster, instead of delighting them, affrighted them; and the party-coloured man raised the contempt of some and the abhorrence of others. Ptolemy, finding the Egyptians preferred symmetry and beauty to the most astonishing productions of art or nature without them, wisely removed his two enormous trifles out of sight; the neglected camel died in a little time, and the man he gave for a song to the musician Thespis.

NOVEMBER, in chronology, the 11th month of the Julian year, consisting only of thirty days: it got the name of November, as being the ninth month of Romulus's year, which began with March.

NO'VENARY. *s.* (*novenarius*, Lat.) Number of nine; nine collectively (*Brown*).

NOVE'RCAL. *a.* (*novercalis*, from *noverca*, Latin.) Having the manner of a stepmother; beseeming a step-mother (*Derham*).

NOUGHT. *s.* (ne auht, Saxon.) 1. Not any thing; nothing (*Fairfax*). 2. In no degree. A kind of adverbial signification (*Fairfax*). 3. *To set at* NOUGHT. Not to value; to slight; to scorn; to disregard (*Proverbs*).

NOVI, a town of Italy, in the territory of Genoa. Near this place, on July 15, 1799, the Austrians and Russians defeated the French, who lost nearly 10,000 men, and their general Joubert was killed. It is 22 miles N.W. of Genoa. Lon. 8. 29 E. Lat. 44. 45 N.

NOVI BAZAR, a considerable town of Turkey in Europe, in Servia. In 1788, the Austrians were repulsed at this place, but they afterward took it at a second assault. Novi is seated near the Oresco, 72 miles W. of Nissa, and 103 S. of Belgrade. Lon. 21. 1 E. Lat. 43. 35 N.

NO'VICE. *s.* (*novice*, Fr. *novitius*, Lat.). 1. One not acquainted with any thing; a fresh man; one in the rudiments of any knowledge (*Shakspeare*). 2. One who has entered a religious house, but not yet taken the vow; a probationer.

NOVIGRAD, a strong town of Upper Hungary, capital of a county of the same name, with a castle. It is seated on a mountain, near the Danube, 25 miles N. of Buda. Lon. 18. 20 E. Lat. 47. 56 N.

NOVIGRAD, a strong town of Turkish Dalmatia, with a castle, seated on a lake of the same name, near the gulf of Venice, 17 miles E. of Nona, and 25 N.W. of Zara. Lon. 16. 35 E. Lat. 44. 36 N.

NOVIGRAD, a strong place of Turkey in Europe, in Servia, seated near the Danube, 35 miles N. of Nissa. Lon. 22. 32 E. Lat. 44. 6 N.

NOVIODUNUM (Cæsar), a town of the Ædui, commodiously seated on the Liguris: the Nivernum of Antonine. Now Nevers in the Orleannois, on the Loire.—A second Noviodunum of the Aulerci Diablintes, in Gallia Celtica, (Antonine); called Noviodunum (Ptolemy), and Noningentum Rotrudum by the moderns: Nogente le Rotrou, capital of the duchy of Perche.—A third of the Bituriges (Cæsar): now Nueve sur Baranion; a village 15 miles to the north of Bourges, towards Orleans.—A fourth, of Mœsia Inferior (Ptolemy), situated on the Ister: now Nivorz, in Bessarabia.—A fifth, of Pannonia Superior (Antonine; now Gurkfeld in Carinthia.—A sixth, Noviodunum Suessionum, the same with Augusta Suessionum.—A seventh, Noviodunum of the Veromandui in Gallia Belgica; (Cæsar): now Noyon in the Isle of France, on the borders of Picardy.

NOVI'TIATE. *s.* (*noviciat*, French.) 1. The state of a novice; the time in which the rudiments are learned (*South*). 2. The time spent in a religious house, by way of trial, before the vow is taken.

NO'VITY. *s.* (*novitas*, Latin.) Newness; novelty (*Brown*).

NOUL. The crown of the head. See NOLL (*Spenser*).

NOULD. He would; would not (*Spenser*).

NOUN. *s.* (*noun*, old French; *nomen*, Latin.) The name of any thing in grammar. See GRAMMAR.

NOVOGOROD, once a powerful independent republic, finally reduced by Ivan Basilowitz II, in 1570, and united to the Russian empire, of which it now forms a government.

NOVOGOROD, one of the most ancient cities of Russia, capital of a government of the same name, and formerly called Great Novogorod, to distinguish it from other Russian towns of the same appellations. It was, for a long time, governed by its own dukes; and

was, in fact, a republic, under the jurisdiction of a nominal sovereign. Its territory extended to the N. as far as the frontiers of Livonia and Finland; comprising great part of the province of Archangel, and a large district beyond the N.W. limits of Siberia. It was the great mart of trade between Russia and the hanseatic cities, and made the most rapid advances in opulence and population. Its power was so great, and its situation so impregnable, as to give rise to a proverb, Who can resist the gods and Great Novogorod? But, in the 15th century, this independent republic was obliged to submit to Ivan Basilowitz I, grand duke of Russia. It continued, nevertheless, the largest and most commercial city in Russia; and contained at least 400,000 souls. It was first desolated, in a manner, by the cruelties of Ivan Basilowitz II; but its splendour was not totally eclipsed until Peter the Great built Petersburgh, to which he transferred all the commerce of the Baltic that had before centered here. It now contains scarcely 7000 souls; but a vast number of churches and convents stand melancholy monuments of its former magnificence. The town stretches on both sides of the Volkoff, a river of considerable depth and rapidity, which separates it into two divisions; namely, the Trading Part and the quarter of St. Sophia; in the latter is a cathedral of the same name, in which several princes of the ducal family, of Russia are interred. Novogorod is situate near the lake Ilmen, 125 miles S.S.E. of Petersburg. Lon 32. 45 E. Lat. 58. 20 N.

NOVOGOROD SEVERSKOI, a town of Russia, capital of a government of the same name, seated on the Desna, 140 miles N.N.E. of Kiof

NOVOGORODECK, a town of Lithuania, capital of a palatinate of the same name, seated in a vast plain, 70 miles S. of Wilna. Lon. 26. 8 E. Lat. 53. 35 N.

NOVOMIRGOROD, a town of Russia, in the government of Catharinenslaf, 136 miles W.N.W. of Catharinenslaf. Lon. 35. 44 E. Lat. 48. 40 N

To NOU'RISH. *v. a.* (*nourrir*, French; *nutrio*, Latin.) 1. To increase or support by food (*Thomson*). 2. To support; to maintain (*Shakspeare*). 3. To encourage; to foment (*Hooker*). 4. To train, or educate (*Timothy*). 5. To promote growth or strength (*Bacon*).

To NOU'RISH. *v. n.* To gain nourishment: unusual (*Bacon*).

NOU'RISHABLE. *a.* (from *nourish.*) Susceptive of nourishment (*Grew*).

NOU'RISHER. *s.* (from *nourish.*) The person or thing that nourishes (*Bacon*).

NOU'RISHMENT. *s.* (*nourissement*, Fr.) 1. That which is given or received, in order to the support or increase of growth or strength; food; sustenance; nutriment (*Newton*). 2. Nutrition; support of strength (*Milton*). 3. Sustentation; supply of things needful.

NOU'RITURE. *s.* (*nourriture*, French.) Education; institution (*Spenser*).

NOU'RSLING. *s.* Nursling (*Spenser*).

To NOU'SEL. *v. a.* To nurse up (*Spenser*).

NOW. *ad.* (nu, Saxon.) 1. At this time; at the time present (*Tillot.*). 2. A little while ago (*Shakspeare*) 3. At one time; at another time (*Pope*). 4. It is sometimes a particle of connection: as, if this be true, he is guilty; *now* this is true, therefore he is guilty (*Rogers*). 5. After this; since things are so (*L'Estran.*). 6. *Now and then*; at one time and another; uncertainly (*Dryden*).

Now. *s.* Present moment (*Cowley*).

NO'WADAYS. *ad.* In the present age.

NO'WED. *a* (*noué*, French.) Knotted; inwreathed (*Brown*).

NOWEL (Alexander), dean of St. Paul's in the reign of queen Elizabeth. He wrote two catechisms, one of which is in Latin, Greek, and Hebrew. He died in 1601.

NOWES. *s.* (from *nou*, old French.) The marriage knot: out of use (*Crashaw*).

NO'WHERE. *ad.* (*no* and *where.*) Not in any place (*Tillotson*).

NO'WISE. *ad.* (*no* and *wise*: this is commonly written by ignorant barbarians, *noways.*) Not in any manner or degree (*Bentley*).

NOX, in fabulous history, one of the most ancient deities among the heathens, daughter of Chaos. From her union with her brother Erebus she gave birth to the Day and Light. She was also the mother of the Parcæ, Hesperides, Dreams, of Discord, Death, Momus, Fraud, &c. She is called by some of the poets the mother of all things, of gods as well as of men, and therefore she was worshipped with great solemnity by the ancients. She had a famous statue in Diana's temple at Ephesus. It was usual to offer her a black sheep, as she was the mother of the Furies.

NO'XIOUS. *a.* (*noxius*, Latin.) 1. Hurtful; harmful; baneful (*Brown*). 2. Guilty; criminal (*Bramhall*). 3. Unfavourable; unkindly (*Swift*).

NO'XIOUSLY. *ad.* Hurtfully; perniciously.

NO'XIOUSNESS. *s.* (from *noxious.*) Hurtfulness; insalubrity (*Hammond*).

NOY (William), attorney-general in the reign of Charles I. was a native of Cornwall, and educated at Exeter college, Oxford, from whence he removed to Lincoln's-inn, where he became eminent as a lawyer He was chosen to represent the borough of Helston in two parliaments, in which he opposed the king's prerogative. In 1631 he was made attorney-general, and then endeavoured to stretch the power of the king as much as he had before done to retrench it. The project for ship money was of his contrivance, and some other measures equally offensive. He died in 1634. Noy was undoubtedly a great lawyer, and left some books of reputation, particularly a treatise of the principal Grounds and Maxims of the Laws of England, 4to. When Noy died, it was anxiously inquired, "How will the king do for a man fit to succeed him?"—"Why any man," said John Reed, groom of the chamber to the earl of Kent, "may execute the place." —"I warrant," says my lord, "thou thinkest thou understandest enough to perform it."—

"Let the king make me attorney-general," quoth John, "and I would fain see that man who durst say, there is any thing which I do not understand!"

NOYON, an ancient town of France, in the department of Oise and late province of the Isle of France. It gave birth to the famous Calvin; and was lately an episcopal see. It is seated near the Oise, 22 miles N.W. of Soissons, and 60 N. by E. of Paris. Lon. 3. 6 E. Lat. 49. 35 N.

NO'ZLE. *s.* (from *nose.*) The nose; the snout; the end (*Arbuth. and Pope.*)

NUAYHAS, the Ague-tree; a name given by the Indians to a sort of Bamboo cane, the leaves of which falling into the water, are said to impregnate it with such virtue, that the bathing in it afterwards will cure the ague. They use also a decoction of the leaves to dissolve coagulated blood, giving it internally, and at the same time rubbing the bruised part externally with it. It is said that this plant bears its flowers only once in its life; that it lives sixty years before those make their appearance; but that when they begin to show themselves, it withers away in about a month afterwards; that is, as soon as it has ripened the seed. There seems to be something of fiction in the account of many other particulars relating to this tree in the Hortus Malabaricus; but it seems certain, that the length of the stalks, or trunk, must be very great: for in the gallery of Leyden there is preserved a cane of it 28 feet long; and another not much shorter in the Ashmolean museum at Oxford, and which is more than eight inches in diameter: yet both these appear to be only parts of the whole trunk, they being nearly as large at one end as at the other.

To NU'BBLE. *v. a.* (properly *to knubble.*) To bruise with handy cuffs (*Ainsworth*).

NUBECULA, little cloud, in surgery, a term sometimes used for a disease in the eye, wherein objects appear as through a cloud or mist. The nubecula seems to arise from certain gross particles detained in the pores of the cornea, or swimming in the aqueous humour, and thus intercepting the rays of light. Nubecula, or nubes, is also used for what we otherwise call albugo. See ALBUGO.

NUBIA, a country of Africa, bounded on the N. by Egypt, E. by the Red Sea, S. by Abyssinia and Darfoor, and W. by Bornou. It is about 600 miles in length, and 450 in breadth. The Nile runs through it; on the banks of which it is fruitful, but in other places barren, sandy, and destitute of water. The inhabitants make their bread and drink of a small round seed called doca, or seff, which is a kind of millet. Their houses have mud walls, are very low, and covered with reeds. The dress of the better sort is a vest without sleeves, and they have no coverings for their heads, legs, and feet. The common people wrap a piece of linen cloth about them, and the children go quite naked. They are a stupid debauched people, but profess to be Mahomedans. The productions of the country are gold, elephants teeth, civet, and sandal-wood; and a great many slaves are sent into Egypt. It is divided into several kingdoms, and those best known to the Europeans are Sennar and Dongola.

NUBI'FEROUS. *a.* (*nubifer*, Lat.) Bringing clouds.

To NU'BILATE. *v. a.* (*nubilo*, Latin.) To cloud.

NU'BILE. *a.* (*nubile*, Fr.; *nubilis*, Lat.) Marriageable; fit for marriage (*Prior*).

NUCAMENT, in botany, the same with ament. Hence nucamentaceæ, the name of the seventeenth order in Linnéus's Fragments of a Natural Method.

NUCA. (*nucha.*) The hind part or nape of the neck.

NUCESTA. See NUX MOSCHATA.

NUCI'FEROUS. *a.* (*nuces* and *fero*, Lat.) Nut-bearing.

NU'CLEUS. *s.* (Latin.) A kernel; any thing about which matter is gathered or conglobated (*Woodward*).

NUCULÆ SAPONARIÆ. Baccæ Bermudenses. Soap berries. Bermudas berries. A spherical fruit about the size of a cherry, whose cortical part is yellow, glossy, and so transparent as to shew the spherical black nut which rattles within, and which includes a black kernel. It is the produce of the sapindus saponaria of Linnéus. The cortical part has a bitter taste, and no smell; it raises a soapy froth with water, and has similar effects with soap in washing, and it is said to be a medicine of singular and specific virtue in chlorosis. See SAPINDUS. These berries are now sold for necklaces.

NUDA'TION. *s.* (*nudation*, Fr. *nudo*, Lat.) The act of making bare or naked.

NU'DITY. *s.* (*nudité*, Fr.; *nudus*, Lat.) Naked parts (*Dryden*).

NUDIUSCULE, in botany, almost or rather naked.

NU'EL. See NEWEL.

NUGA'CITY. *s.* (*nugax*, Latin.) Futility; trifling talk or behaviour.

NUGA'TION. *s.* (*nugor*, Latin.) The act or practice of trifling (*Bacon*).

NU'GATORY. *a.* (*nugatorius*, Lat.) Trifling; futile; insignificant (*Bentley*).

NUI'SANCE. *s.* (*nuisance*, French.) 1. Something noxious or offensive (*South*). 2. (In law.) Something that incommodes the neighbourhood (*Kettlewell*).

To NULL. *v. a.* (*nullus*, Latin.) To annul; to annihilate (*Milton*).

NULL. *a.* (*nullus*, Lat.) Void; of no force; ineffectual (*Swift*).

NULL. *s.* Something of no power, or no meaning (*Bacon*).

NULLIBI'ETY. *s.* (from *nullibi*, Lat.) The state of being nowhere.

To NU'LLIFY. *v. a.* (from *nullus*, Latin.) To annul; to make void.

NU'LLITY. *s.* (*nullité*, French.) 1. Want of force or efficacy (*South.*). 2. Want of existence (*Bacon*).

NUMA (Pompilius), a celebrated philosopher of Cures, who married Tatia, the daughter

of Tatius, the king of the Sabines. At the death of Romulus, the Romans fixed upon him to be their king, and two senators were sent to acquaint him with the decision. Numa at first refused their offer, and was at length with difficulty prevailed upon to accept the crown. He was not, like Romulus, fond of war, but he applied himself to tame the ferocity of his subjects, to inculcate a reverence for the Deity, and to quell their dissentions, by dividing all the citizens into different classes. He established different orders of priests, and encouraged the report which was spread of his paying regular visits to the nymph Egeria, and made use of her name to give sanction to the laws and institutions which he had introduced. He told the Romans that the safety of the empire depended upon the preservation of the sacred ancyle or shield, which, as was generally believed, had dropped down from heaven. (Vid. ANCYLE.) He dedicated a temple to Janus, which, during his whole reign, remained shut as a mark of peace and tranquillity at Rome. Numa died after a reign of 43 years, in which he had given every possible encouragement to the useful arts, and in which he had cultivated peace, B.C. 672. He left behind one daughter called Pompilia, who married Numa Marcius, and became the mother of Ancus Martius, the fourth king of Rome.

NUMANTIA, a town of Spain, near the sources of the river Durius, celebrated for the long war which it maintained against the Romans. It was taken by Scipio Africanus, B.C. 133. The besieged were at last necessitated to kill and devour each other, and it is said that not even one survived to adorn the triumph of the conqueror. The fall of Numantia was more glorious than that of Carthage or Corinth, though inferior to them. The conqueror obtained the sirname of Numanticus.

NUMB. *a.* (benumen, Saxon.) 1. Torpid; chill; motionless (*Shakspeare*). 2. Producing chillness; benumbing (*Shakspeare*).

To NUMB. *v. a.* To make torpid; to make dull of motion or sensation; to deaden; to stupify (*Shakspeare*).

NU'MBEDNESS. *s.* (from *numbed.*) Torpor; interruption of sensation (*Wiseman*).

To NU'MBER. *v. a.* (*nombrer*, Fr. *numero*, Latin.) 1. To count; to tell; to reckon how many (*Numbers*). 2. To reckon as one of the same kind (*Isa.*).

NU'MBER. *s.* (*nombre*, Fr. *numerus*, Lat.) 1. The species of quantity by which it is computed how many (*Shakspeare*). 2. Any particular aggregate of units, as *even* or *odd* (*Shakspeare*). 3. Many; more than one (*Addison*). 4. Multitude that may be counted (*Milton*). 5. Comparative multitude (*Bacon*). 6. Aggregated multitude (*Bacon*). 7. Harmony; proportions calculated by *number* (*Milton*). 8. Verses; poetry (*Pope*). 9. (In grammar.) In the noun is the variation or change of termination to signify a *number* more than one (*Clarke*).

NUMBER, a unit or an assemblage of several units, or things of the same kind. (See ARITHMETIC.) Number, says Malcolm, is either abstract or applicate: abstract, when referred to things in general, without attending to their particular properties; and applicate, when considered as the number of a particular sort of things, as yards, trees, or the like. When particular things are mentioned, there is always something more considered than barely their numbers; so that what is true of numbers in the abstract, or when nothing but the number of things is considered, will not be true when the question is limited to particular things: for instance, the number two is less than three; yet two yards is a greater quantity than three inches: and the reason is, because regard must be had to their different natures as well as number, whenever things of a different species are considered; for though we can compare the number of such things abstractedly, yet we cannot compare them in any applicate sense. And this difference is necessary to be considered, because upon it the true sense, and the possibility or impossibility, of some questions depend. Number is unlimited in respect of increase; because we can never conceive a number so great but still there is a greater. However, in respect of decrease it is limited; unity being the first and least number, below which therefore it cannot descend.

NUMBERS (Kinds and distinctions of). Mathematicians, considering number under a great many relations, have established the following distinctions:

Broken numbers are the same with fractions.

Cardinal numbers are those which express the quantity of units, as 1, 2, 3, 4, &c. whereas ordinal numbers are those which express order, as 1st, 2d, 3d, &c.

Compound number, one divisible by some other number besides unity; as 12, which is divisible by 2, 3, 4, and 6. Numbers, as 12 and 15, which have some common measure besides unity, are said to be compound numbers among themselves.

Cubic number is the product of a square number by its root: such is 27, as being the product of the square number 9 by its root 3. All cubic numbers, whose root is less than 6, being divided by 6, the remainder is the root itself; thus 27 ÷ 6 leaves the remainder 3, its root; 216, the cube of 6, being divided by 6, leaves no remainder; 343, the cube of 7, leaves a remainder 1, which added to 6, is the cube root; and 512, the cube of 8, divided by 6, leaves a remainder 2, which added to 6, is the cube root. Hence the remainders of the divisions of the cubes above 216, divided by 6, being added to 6, always gives the root of the cube so divided till that remainder be 5, and consequently 11, the cube-root of the number divided. But the cubic numbers above this being divided by 6, there remains nothing, the cube-root being 12. Thus the remainders of the higher cubes are to be added to 12 and not to 6, till you come to 18, when the remainder of the division must be added to 18; and so on *ad infinitum*.

Determinate number is that referred to some given unit, as a ternary or three: whereas an indeterminate one is that referred to unity in general, and is called quantity.

Homogeneal numbers are those referred to the same unit; as those referred to different units are termed heterogeneal

Whole numbers are otherwise called integers.

Rational number is one commensurable with unity; as a number incommensurable with unity is termed irrational, or a surd.

In the same manner, a rational whole number is that whereof unity is an aliquot part; a rational broken number, that equal to some aliquot part of unity; and a rational mixed number, that consisting of a whole number and a broken one.

Even number, that which may be divided into two equal parts without any fraction, as 6, 12, &c. The sum, difference, and product, of any number of even numbers is always an even number.

An evenly even number is that which may be measured or divided, without any remainder, by another even number, as 4 by 2.

An unevenly even number, when a number may be equally divided by an uneven number, as 20 by 5.

Uneven number, that which exceeds an even number, at least by unity, or which cannot be divided into two equal parts, as 3, 5, &c.

The sum or difference of two uneven numbers makes an even number; but the factum of two uneven ones makes an uneven number.

If an even number be added to an uneven one, or if the one be subtracted from the other, in the former case the sum, in the latter the difference, is an uneven number; but the factum of an even and uneven number is even.

The sum of any even number of uneven numbers is an even number; and the sum of any uneven number of uneven numbers is an uneven number.

Primitive or prime numbers are those divisible only by unity, as 5, 7, &c. And prime numbers among themselves, are those which have no common measure besides unity, as 12 and 19.

Perfect number, that whose aliquot parts added together make the whole number, as 6, 28; the aliquot parts of 6 being 3, 2, and 1 = 6; and those of 28 being 14, 7, 4, 2, 1, = 28.

Imperfect numbers, those whose aliquot parts added together make either more or less than the whole. And these are distinguished into abundant and defective: an instance in the former case is 12, whose aliquot parts 6, 4, 3, 2, 1, make 16; and in the latter case 16, whose aliquot parts 8, 4, 2, and 1, make but 15.

Plain number, that arising from the multiplication of two numbers, as 6, which is the product of 3 by 2; and these numbers are called the sides of the plane.

Square number is the product of any number multiplied by itself; thus 4, which is the factum of 2 by 2, is a square number.

Every square number added to its root makes an even number.

Polygonal or polygonous numbers, the sums of arithmetical progressions beginning with unity: these, where the common difference is 1, are called triangular numbers; where 2, square numbers; where 3, pentagonal numbers; where 4, hexagonal numbers; where 5, heptagonal numbers, &c.

Pyramidal numbers, the sums of polygonous numbers, collected after the same manner as the polygons themselves, and not gathered out of arithmetical progressions, are called first pyramidal numbers; the first of the pyramidals are called second pyramidals, &c.

If they arise out of triangular numbers, they are called triangular pyramidal numbers; if out of pentagons, first pentagonal pyramidals.

From the manner of summing up polygonal numbers, it is easy to conceive how the prime pyramidal numbers are found, *viz.* $\frac{(a-2)n^3+3n^2-(a-5)n}{6}$ expresses all the prime pyramidals.

The number nine has a very curious property, its products always composing either 9 or some lesser product of it. We have already given an account of this, with the examples from Hume, under the article NINE; and we need not repeat them. Did our limits permit us, we could instance in a variety of other properties numbers both curious and surprising. Such speculations are indeed by some men considered as trifling and useless: but perhaps they judge too hastily; for few employments are more innocent, none more ingenious, nor, to those who have a taste for them, more amusing. For more on this subject we refer to Hutton's edition of Montucla's Recreations, vol. I. Legendre's Essay on the Theory of Numbers, Gauss's Arithmetical Researches, and Barlow's Treatise on the Properties of Numbers.

NUMBER (Golden). See CHRONOLOGY.

NUMBERS, in poetry, oratory, &c. are certain measures, proportions, or cadences, which render a verse, period, or song, agreeable to the ear.

Poetical numbers consist in a certain harmony, in the order, quantities, &c. of the feet and syllables, which make the piece musical to the ear, and fit for singing, for which all the verses of the ancients were intended. (See POETRY.) It is of these numbers Virgil speaks in his ninth Eclogue, when he makes Lycidas say, *Numeros memini, si verba tenerem*; meaning, that, although he had forgot the words of the verses, yet he remembered the feet and measure of which they were composed.

Rhetorical or prosaic numbers are a sort of simple unaffected harmony, less glaring than that of verse, but such as is perceived and affects the mind with pleasure. The numbers are that by which the style is said to be easy, free, round, flowing, &c. Numbers are things absolutely necessary in all writing, and even in all speech. Hence Aristotle, Tully, Quintilian, &c. lay down abundance of rules as to the best manner of intermixing dactyles, spondees,

anapests, &c. in order to have the numbers perfect.

NUMBERS (Book of), the fourth book of the Pentateuch, taking its denomination from its numbering the families of Israel. A considerable part of this book is historical, relating to several remarkable passages in the Israelites march through the wilderness. It contains a distinct relation of their several movements from one place to another, or their two and forty stages through the wilderness, and many other things, whereby we are instructed in some of the weightiest truths that have immediate reference to God and his providence in the world. But the greatest part of this book is spent in enumerating those laws and ordinances, whether civil or ceremonial, which were given by God, but not mentioned before in the preceding books.

NU'MBERER. *s.* (from *number.*) He who numbers.

NU'MBERLESS. *a.* (from number.) Innumerable; more than can be reckoned.

NU'MBLES. *s.* (*nombles*, Fr.) The entrails of a deer (*Bailey*).

NU'MBNESS. *s.* (from *numb.*) Torpor; deadness; stupefaction (*Milton*).

NUMELLÆ, in Roman antiquity, instruments of punishment, in which the feet and the neck of the culprit were fastened in the most uneasy posture imaginable.

NUMENIA, or NEOMENIA, a festival observed by the Greeks at the beginning of every lunar month, in honour of all the gods, but especially of Apollo, or the sun, who is justly deemed the author of light, and of whatever distinction is made in the months, seasons, days, and nights. The demigods, as well as the heroes of the ancients, were honoured and invoked in the festival.

NUMENIUS, a philosopher who supposed that Chaos, from which the world was created, was animated by an evil and maleficent soul. He lived in the second century.

NU'MERABLE. *a.* (*numerabilis*, Latin.) Capable to be numbered.

NU'MERAL. *a.* (*numeral*, French.) Relating to number; consisting of number (*Locke*).

NUMERAL CHARACTERS. See CHARACTERS.

NUMERAL FIGURES. The antiquity of these in England has, for several reasons, been supposed as high as the eleventh century; in France about the middle of the tenth century; having been introduced into both countries from Spain, where they had been brought by the Moors or Saracens. See Wallis's Algebra, p. 9, &c. and p. 153 of the additions at the end of the same. See also Philos. Trans. numb. 439 and 475.

It is a curious fact that the numerals of the New Zealanders are divided into tens, hundreds, thousands, &c. as among Europeans. The terms they make use of are easily comprehended; as, for example:

Catteekaw	10
Catteekaw cudooa	20
Catteekaw catoodoo	30
Catteekaw cawha	40
Catteekaw cadeemu	50
Catteekaw cohoonoo	60
Catteekaw caheetoo	70
Catteekaw cawarroo	80
Catteekaw caheewha	90
Catteekaw caraw	100
Caruarow	200
Catraorow	300
Cawurow	400
Careemarow	500
Caonarow	600
Cawitarow	700
Cawarorow	800
Cahiwoorow	900
Camanno	1000
Caruo manno	2000
Catroo manno	3000
Cawu manno	4000
Careema manno	5000
Caona manno	6000
Cawita manno	7000
Cawaro manno	8000
Cahiwoo manno	9000
Catinnee	10000

NUMERAL LETTERS, those letters of the alphabet that are commonly used for figures or numbers, as I, V, X, L, C, D, M.

Numbers were by the Jews, as well as the ancient Greeks and Romans, expressed by letters of the alphabet; hence we may conceive how imperfect and limited their arithmetic was, because the letters could not be arranged in a series, or in different lines, conveniently enough for the purposes of ready calculation. The invention of the cypher, or arithmetical figures, which we now make use of, has given us a very great advantage over the ancients in this respect.

Mankind, we may reasonably suppose, first reckoned by their fingers, which they might indeed do in a variety of ways. From this digital arithmetic, very probably, is owing the number 10, which constitutes the whole set of arithmetical figures.

The letters chiefly employed by the Romans to express numbers were, M, for 1000; D, for 500; C, for 100; L, for 50; V, for 5; X, for 10; and I, for 1.—M probably signified 1000, because it is the initial of *mille*; D stands for 500, because it is *dimidium mille*; C signifies 100, as being the first letter of the word *centum*; L stands for 50, because it is the half of C, having formerly been wrote thus ⊂; V signifies 5, because V is the fifth vowel; X stands for 10, because it contains V or V in a double form; I stands for one, because it is the first letter of *initium*. These however are fanciful derivations.

NU'MERALLY. *ad.* (from *numeral.*) According to number (*Brown*).

NU'MERARY. *a.* (*numerus*, Latin.) Belonging to a certain number (*Ayliffe*).

NUMERATION. *s.* (*numeration*, French; *numeratio*, Latin.) 1. The art of numbering

(*Locke*). 2. Number contained (*Brown*). 3. The rule of arithmetic which teaches the notation of numbers, and method of reading numbers, regularly noted.

In Mr. Southey's History of Brazil we are informed that the Orinoco tribes count as far as five, then proceed to five-one, five-two, as far as two fives, and so on to four fives. This is digitary numeration. It is remarkable how far the Achaguas carry it: with them, abacaje means five, and the fingers of one hand: tuchamacaje, ten, or all the fingers; abacatakay, twenty, or all the fingers and toes; incha matacacay, forty, or two persons complement; and so, says Gumilla (c. 48), they can go on to 2000, 6000, and 10,000 fingers, in a jargon, which by dint of labour and attention may be understood at last.

Herrera (4. 10. 4.) describes a curious mode of arithmetic in Yucatan. They count, he says, by fives till they come to twenty, and then by twenties as far as a hundred, then to 400, and then to 8000, and from thence to infinity. This numeration, which is not very clearly explained by Herrera, is founded on fives for small numbers; scores and five-scores for 100; then for larger numbers they use twenties as we use tens: thus 20 times 20 is 400, 20 times 400 is 8000, and so on. "A friend of mine," says Mr. Southey, "better acquainted with such subjects than I am, tells me, it is the only specimen he has met with of vigesimal numeration. Our score is the nearest similitude." See NUMERAL and SCALE.

NUMERATOR, of a fraction, is the number which shows how many of those parts, which the integer is supposed to be divided into, are denoted by the fraction. And, in the notation the numerator is set over the denominator, or number that shows into how many parts the integer is divided, in the fraction. So, ex. gr. $\frac{3}{4}$ denotes three-fourths, or 3 parts out of 4; where 3 is the numerator, and 4 the denominator.

NUMERANUS (M. Aurelius,) a son of the emperor Carus. He accompanied his father into the east with the title of Cæsar, and at his death he succeeded him with his brother Carinus, B. C. 282. His reign was short. Eight months after his father's death he was murdered in his litter by his father-in-law Arrius Aper, who accompanied him in an expedition. Numerianus has been admired for his learning as well as his moderation. He was naturally an eloquent speaker, and in poetry he was inferior to no writer of his age.

NUME'RICAL. *a.* (from *numerus*, Latin.) 1. Numeral; denoting number (*Locke*). 2. The same not only in kind or species, but number (*South*).

NUME'RICALLY. *ad.* (from *numerical.*) With respect to sameness in number (*Boyle*).

NU'MERIST. *s.* (from *numerus*, Latin.) One that deals in numbers (*Brown*).

NUMERO'SITY. *s.* (from *numerosus*, Lat.) 1. Number; state of being numerous (*Brown*). 2. Harmony; numerous flow.

NU'MEROUS. *a.* (*numerosus*, Latin). 1. Containing many; consisting of many; not few; many (*Waller*). 2. Harmonious; consisting of parts rightly numbered; melodious; musical (*Dryden*).

NU'MEROUSNESS. *s.* (from *numerous.*) 1. The quality of being numerous. 2. Harmony; musicalness (*Dryden*).

NUMIDIA, an ancient kingdom of Africa, bounded on the north by the Mediterranean Sea; on the south by Gætulia, or part of Libya Interior; on the west by the Mulucha, a river which separated it from Mauritania; and on the east by the Tusca, another river which bounded it in common with Africa Propria. Dr. Shaw has rendered it probable, that the river which formerly went under the denominations of Malva, Malvana, Mulucha, and Molochath, is the same with that now called Mullooiah by the Algerines; in which case, the kingdom of Numidia must have extended upwards of 500 miles in length: its breadth, however, cannot be so well ascertained; but supposing it to have been the same with that of the present kingdom of Algiers, in the narrowest part it must have been at least 40 miles broad, and in the widest upwards of 100.

This country included two districts; one inhabited by the Massyli, and the other by the Masæsyli; the latter being also called in after times Mautitania Cæsariensis, and the former Numidia Propria. The country of the Massyli, or, as some call it, Terra Metagonitis, was separated from the proper territory of Carthage by its eastern boundary the river Tusca, and from the kingdom of the Masæsyli, or Mauritania Cæsariensis, by the river Ampsaga. It seems to correspond with that part of the province of Constantina lying between the Zaine and the Wed al Kibeer, which is above 130 miles long, and more than 100 broad. The sea-coast of this province is for the most part mountainous and rocky, answering to the appellation given to it by Abulfeda, viz. El Edwaa, the high, or lofty. It is far from being equal in extent to the ancient country of the Masæsyli; which, Strabo informs us, was yet inferior to the country of the Massyli. Its capital was Cirta, a place of very considerable note among the ancients.

NUMIDIA. Pintado. Guinea-hen. In zoology, a genus of the class aves, order gallinæ. Bill strong, short, the base covered with a carunculate cere receiving the nostrils; head horned, with a compressed coloured callus; tail short, bending down; body speckled. Four species, of which N. meleagris, or common Guinea-hen, is the only one worth minutely describing. This is specifically characterised by having double caruncles at the gape, and being without gular fold. There are two other varieties; one with the breast white, the other with the body entirely white. The bill is of a reddish horn-colour, head blue, the crown with a conic, compressed, blueish-red protuberance; upper part of the neck blueish-

ish, almost naked; lower part feathered, verging to a violet hue; body black, with round white spots; legs grey-brown. It inhabits Africa, and is domesticated in most parts of Europe; twenty-two inches long; makes a harsh unpleasant cry; and is noisy, restless, and turbulent; continually moving from place to place, and domineering over the whole poultry yard. The turkies, though twice its size, are in continual apprehension from its petulance. So quick are its motions, that these large unwieldy birds may receive twenty strokes from it before they have put themselves into a posture of defence. It seems to have the same mode of fighting that Sallust ascribes to the Numidian cavalry: their charge was brisk, but irregular; upon resistance they turned their backs, but in a moment wheeled about, and fell again upon the enemy. This genus seems, in many respects, to resemble the common poultry. Like them, it scratches the ground, and goes in large flocks, feeding its young, and pointing out their food. In the Cape Verd islands several hundreds are sometimes seen together, where the inhabitants pursue them with dogs; and, as their flight is heavy, whenever they are run down, they are easily killed with poles. The male and female so nearly resemble each other, that they can hardly be distinguished: the only difference is, that the wattles, which are blue in the former, are inclining to red in the latter.

Pintados were originally from Africa, and were known to the ancients by the name of Numidian hens. They are named at present, in different countries of Europe, from that district of Africa from which they are brought. They are more frequently domesticated in those countries that border on the Mediterranean than with us; and into these were, probably, more early introduced, from their vicinity to Africa, throughout which they have been long universally spread. In our northern climate they are neither fertile, nor easily reared; and are rather kept for show than for use. It appears from Edwards, that they were very rare in England before the commencement of the present century.

The pintado was known to the ancients at a very early period, and is mentioned by Aristotle under the name of meleagris, in his History of Animals. Varro, Pliny, and Columella, successively describe this bird, of which there were then discovered two species, as they supposed; one with red caruncles, and the other with blue. It has since, however, been ascertained, that this difference of colour characterizes, as we have already observed, the male and female of the same species.

At Rome the pintado was reckoned a rare bird, and reared with great care. It seems to have afterwards become entirely extinct in Europe, upon the downfall of the Western empire; for there is no mention made of it by any writer during the dark ages, till the Europeans began afterwards to frequent the coasts Africa, in their passage to India. From that time, it has again not only been spread over Europe, but transported into America, where varieties of climate and food have produced such alterations in its external form, that naturalists have mistaken it for a new species. M. Brisson regards as a distinct race the white-breasted pintado of Jamaica; while Marcgrave, with more justice, makes a different species of it: the tribe comprises those hooped birds that are seen at Sierra Leona, which have a membraneous collar of a blueish colour around their necks.

The pintado is nearly of the same degree of fertility as the common hen; but in this respect varies much according to climate, being very sensible of cold. In the Isle of France, where these birds are wild, they lay only from eight to twelve eggs; while those of St. Domingo, in a domestic state, lay from an hundred to an hundred and fifty. They are very difficult to rear in northern countries; but their flesh is a very delicate food. A hybrid race has been produced between these birds and our common poultry, but, as usual, it appears incapable of re-production.

NUMISMATOGRAPHIA, a term used for the description and knowledge of ancient coins and medals, whether of gold, silver, or brass. See COINS and MEDALS.

NUMITOR, the son of Procas king of Alba, and the brother of Amulius. Procas before his death made him and Amulius joint heirs to the crown, on condition of their reigning annually by turns: but Amulius, on getting possession of the throne, excluded Numitor, whose son Lausus he ordered to be put to death, and obliged Rhea Sylvia, Numitor's only daughter, to become a vestal. This princess becoming pregnant, declared that she was with child by the god Mars; and afterwards brought forth Rhemus and Romulus, who at length killed Amulius, and restored Numitor to the throne, 754 B. C. See RHEMUS and ROMULUS.

NU'MMARY. *a.* (from *nummus*, Lat.) Relating to money (*Arbuthnot*).

NU'MMULAR. *a.* (*nummularius*, Latin.) Relating to money.

NUMMULARIA. (*nummularia*, Fr. from *nummus*, money; so called because its leaves are round and of the size of the old silver twopence.) Herundinaria. Moneywort. This plant, lysimachia nummularia of Linnéus, is very common in our ditches. It was formerly accounted vulnerary; it possesses antiscorbutic and restringent qualities. See LYSIMARIA.

NU'MSKULL. *s.* (*numb* and *skull*.) 1. A dullard; a dunce; a dolt; a blockhead (*Arbuthnot and Pope*). 2. The head. In burlesque (*Prior*).

NU'MSKULLED. *a.* (from *numskull*.) Dull; stupid; doltish (*Arbuthnot*).

NUN, a woman, in several catholic countries, who devotes herself, in a cloister or nunnery, to a religious life. (See the article MONK.) There were women in the ancient Christian church who made public profession of virginity before the monastic life was known in the world, as appears from the writings of Cyprian and Tertullian. These, for distinction's sake, are sometimes called ecclesiastical

virgins, and were commonly inrolled in the canon or matricula of the church. They differed from the monastic virgins chiefly in this, that they lived privately in their father's houses, whereas the others lived in communities: but their profession of virginity was not so strict as to make it criminal in them to marry afterwards, if they thought fit. As to the consecration of virgins, it had some things peculiar in it: it was usually performed publicly in the church by the bishop. The virgin made a public profession of her resolution, and then the bishop put upon her the accustomed habit of sacred virgins. One part of this habit was a veil, called the sacrum velamen; another was a kind of mitre or coronet worn upon the head. At present, when a woman is to be made a nun, the habit, veil, and ring of the candidate are carried to the altar; and she herself, accompanied by her nearest relations, is conducted to the bishop, who, after mass and an anthem (the subject of which is, "that she ought to have her lamp lighted, because the bridegroom is coming to meet her)," pronounces the benediction: then she rises up, and the bishop consecrates the new habit, sprinkling it with holy water. When the candidate has put on her religious habit, she presents herself before the bishop, and sings, on her knees, Ancilla Christi sum, &c.; then she receives the veil, and afterwards the ring, by which she is married to Christ; and lastly, the crown of virginity. When she is crowned, an anathema is denounced against all who shall attempt to make her break her vows.

NUN, or VLED DE NUN, a province in the south part of the kingdom of Sus. The emperor of Morocco arrogates to himself the sovereignty, but his real authority is extremely feeble. This desert province is inhabited by different tribes of Arabs, whose camps are scattered over such interior parts of the country as are capable of cultivation. It has a river of the same name, which enters the Atlantic on the north side of Cape Non.

NU'NCHION. *s.* A piece of victuals eaten between meals (*Hudibras*).

NU'NCIATURE. *s.* (from *nuncio*, Latin.) The office of a nuncio.

NU'NCIO. *s.* (Italian; from *nuncius*, Lat.) 1. A messenger; one that brings tidings (*Shakspeare*). 2. A spiritual envoy from the pope (*Atterbury*).

NUNCUPA'TIVE. NUNCUPA'TORY. *a.* (*nuncupatus*, Lat. *nuncupatif*, French.) 1. Publicly or solemnly declaratory. 2. Verbally pronounced.

NUNDINA, a goddess whom the Romans invoked when they named their children. This happened the ninth day of their birth, whence the name of the goddess Nonadies.

NUNDYDROOG, a town and fortress of Hindustan, capital of a considerable district, in Mysore. It is built on the summit of a mountain, 1700 feet in height, the greater part inaccessible; but was besieged and taken by the English, under lord Cornwallis, in 1792. It is 79 miles north of Seringapatam.

NUNEATON, a town in Warwickshire, with a market on Saturday, and manufactures of woollen cloth and ribands. It was formerly noted for its nunnery, and is seated on the river Anker, nine miles N. by E. of Coventry, and 98 N.W. of London.

NUNNERY, a house or convent for the reception of female religious, who retire from the world under a vow. See NUN.

NUNNIA, the name given by the Greek to the song or melody used by nurses; a lullaby.

NU'PTIAL. *a.* (*nuptial*, French; *nuptialis*, Latin.) Pertaining to marriage; constituting marriage; used in marriage (*Dryden*).

NU'PTIALS. *s.* (*nuptiæ*, Lat.) Marriage.

NURENBERG, a city of Franconia (lately imperial), capital of a territory of the same name, with a university. It is six miles in circumference, surrounded by high walls, flanked with 365 towers: and through the middle of it flows the river Pegnitz, over which are six stone bridges, and several of wood. The inhabitants, estimated at 30,000, are very industrious, and the best workmen in arts: their maps and prints are in high esteem, as well as their musical and mathematical instruments; nor are they less curious in clockwork, and in the several manufactures of iron, steel, ivory, wood, and alabaster. The best toys are made here, which are commonly known in England by the name of Dutch toys. Here is a famous academy for painting, an anatomical theatre, and a public library. The ancient castle or palace is still standing at the extremity of the city; and the arsenal is one of the best in Germany. The houses are built of freestone, and are four or five stories high. Though the religion is the Lutheran, the church of the Holy Ghost has a variety of relics; as also the imperial crown, sceptre, &c. the sword of St. Maurice, and the gloves, slippers, and hereditary crown of emperor Rodolph II. No Jews are suffered to lodge a single night here; nor can they enter the city without paying a certain tax. Nurenberg has obtained a considerable territory, 100 miles in circumference, in which are two large forests. In 1807, by the treaty of Tilsit, it was given to Bavaria. It is 95 miles N. by W. of Munich, and 250 W.N.W. of Vienna. Lon. 11. 4 E. Lat. 49. 27 N.

NURSE. *s.* (*nourrice*, Fr.) 1. A woman that has the care of another's child (*Raleigh*). 2. A woman that has care of a sick person (*Shakspeare*). 3. One who breeds, educates, or protects (*Shakspeare*). 4. An old woman, in contempt (*Blackmore*). 5. The state of being nursed (*Cleaveland*). 6. In composition, any thing that supplies food (*Walton*).

To NURSE. *v. a.* (*nourrir*, French.) 1. To bring up any thing young (*Dryden*). 2. To bring up a child not one's own (*Exodus*). 3. To feed; to keep; to maintain (*Addison*). 4. To tend the sick. 5. To pamper; to foment; to encourage.

NU'RSER. *s.* (from *nurse*.) 1. One that nurses: not used (*Shakspeare*). 2. A promoter; a fomenter.

NURSERY. *s.* (from *nurse.*) 1. The act or office of nursing (*Shakspeare*). 2. That which is the object of a nurse's care (*Milton*). 3. A plantation of young trees to be transplanted to other ground (*Addison*). 4. Place where young children are nursed and brought up (*Bacon*). 5. The place or state where any thing is fostered or brought up (*Shakspeare*).

NURSERY, in gardening, a portion of ground set apart for propagating and raising various sorts of trees, shrubs, and herbaceous plants to proper states of growth for supplying gardens, orchards, plantations, and other departments of horticulture.

In the distribution of the different sorts in the nursery grounds, every sort should be kept separate: the fruit-trees, forest-trees, &c. occupying a space not remote from each other; the shrub kinds ranged in the vicinity; and suitable plots being allotted to the herbaceous perennials and tender plants, defended with yew, privet hedges, or a reed fence, in which may also be set such plants in pots as are a little tender while young, and require occasional shelter from frost, but not so tender as to need being housed like green-house plants. And in such places frames of various sizes may be placed, either to be covered occasionally with glass lights or with mats, to contain many of the more choice tender kinds in pots, to be nursed a year or two or even longer, with occasional shelter, till gradually hardened to bear the open air.

The arrangement of all the sorts in the open grounds should always be in lines or nursery rows, the fruit-stocks, &c. for grafting and budding upon being placed two feet asunder when for dwarfs, and for standards two feet and a half, and a foot and a half in the lines. But, as after being grafted and budded they become fruit-trees, &c. whenever it is intended they should stand till they have grown to a large size, the width of a yard should be allowed between the different rows. Forest-trees should also be placed in rows from two to three feet asunder, and half that distance in the lines, varying the distance both ways, according to the time they are to stand. The shrubs may be placed in rows about two feet asunder, and from fifteen to eighteen inches distant in each line. And the herbaceous plants may be generally disposed in four-feet-wide beds, or larger borders, in rows or distances from six to twelve or eighteen inches asunder, according to their nature of growth and the time they are to stand or remain in them. By which mode of arrangement a great number of plants will be included within a narrow compass, yet the compass will be sufficient, as they are only to remain for a short period; and they will also hereby be kept more readily under proper regulation.

In public grounds of this sort many kinds of seedling-trees and shrubs are planted out often in much closer rows at first than those now proposed, not only with a view of husbanding the ground to the best advantage, but by standing closer, to encourage the different stems to shoot more directly upwards, and prevent their expanding themselves much in any direction but at the top. Thus especially are many sorts of ever-greens of slow growth during the first year or two managed and arranged, such as pine-trees, firs, and larches. These the nursery-gardeners often prick out from the seminary, first into four-feet-wide beds in rows lengthways, six inches asunder; and after having allowed them one or two years growth here, they transplant them in rows a foot asunder; and a year or two after give them another and final transplantation in the nursery, in rows two or three feet asunder as above. These different transplantings encourage the roots to branch out into many horizontal fibres, and prepare them better for their ultimate destination.

Sometimes these various plants are pricked out by dibble, after being reared as above; in other cases they are put in by the spade, either by trenches, slitting in, trenching, or holing; while several are drilled in by a drill or hoe, according to the kinds.

In a nursery designed altogether for fruit-trees, the following rules are to be observed: 1. That the soil should not be better than that in which the trees are to be planted out for good. 2. That it ought to be fresh, and not such as has been already worn out by trees, or other large growing plants. 3. It ought neither to be too wet nor too dry, but rather of a middling nature; though of the two extremes, dry is to be preferred; because, though trees in such a soil do not make so great a progress, yet they are generally sounder, and more disposed to fruitfulness. 4. It must be inclosed in such a manner that neither cattle nor vermin may enter; and so as particularly to exclude hares and rabbits, which, when the ground is covered with snow, are great destroyers of young trees. 5. The ground being inclosed should be carefully trenched about two feet deep; this should be done in August, that it may be ready for receiving young stocks at the season for planting, which is commonly about the beginning of October: in trenching the ground you must be careful to cleanse it from the roots of all noxious weeds. 6. The season being come for planting, level down the trenches as equal as possible; and then lay out the ground into quarters, which may be laid out in beds for a seminary, in which you may sow the seeds or stones of fruit. 7. And having provided yourself with stocks, the next year proceed to transplant them in the following manner: draw a line across the ground intended to be planted, and open a number of trenches exactly straight; then take the stocks out of the seed-beds; in doing which, you should raise the ground with a spade, in order to preserve the roots as entire as possible; prune off the very small fibres, and if there are any that have a tendency to root directly downwards, such roots should be shortened. Then plant them in the trenches, if they are designed for standards, in rows three feet and a half, or four feet, from each other, and a foot

and a half distant in the rows; but if for dwarfs, three feet row from row, and one foot in the row, will be a sufficient distance. These plants should by no means be headed, or pruned at top, which will weaken them, and cause them to produce lateral branches. If the winter should prove very cold, lay some mulch on the surface of the ground near their roots, taking care not to let it lie too thick near the stems of the plants, and to remove it as soon as the frost is over. In the summer season destroy the weeds, and dig up the ground every spring between the rows. The second year after planting, such of the stocks as are designed for dwarfs will be fit to bud; but those that are designed for standards should be suffered to grow five or six feet high before they are budded or grafted; for the manner of doing which, see GRAFTING.

As to timber trees, Mr. Miller advises those gentlemen who would have plantations in parks, woods, &c. to make nurseries upon the ground intended for planting, where a sufficient number of the trees may be left standing, after the others have been drawn out to plant in other places.

The ground intended for the flower-nursery should be well situated to the sun, and defended from strong winds by plantations of trees, or by buildings. The soil also should be light and dry, especially for bulbous-rooted flowers; for in this nursery the offsets of all bulbous-rooted flowers should be planted, and remain there till they become blowing roots, when they should be removed into the pleasure-garden, and planted either in beds or borders, according to the goodness of the flowers. These flowers may also be raised in the nursery from seed. The seedling auriculas, polyanthuses, ranunculuses, anemonies, carnations, &c. should be raised in this nursery, where they should be preserved till they have flowered, when all those should be marked that are worthy of being transplanted into the flower-garden: this should be done in their proper seasons; for all these seedling flowers ought not indiscriminately to be exposed to public view in the pleasure-garden, because it always happens, that there are great numbers of ordinary flowers produced among them, which will there make but an indifferent appearance.

NU'RSLING. *s.* (from *nurse.*) One nursed up; a fondling (*Dryden*).

NU'RTURE. *s.* (contracted from *nourriture*, French.) 1. Food; diet (*Milton*). 2. Education; institution (*Spenser*).

To NU'RTURE. *v. a.* (from the noun.) 1. To educate; to train; to bring up (*Walton*). 2. To *nurture up*; to bring by care and food to maturity (*Bentley*).

NUSANCE. See NUISANCE.

NUSSERPOUR, a town of Hindustan, capital of a country of the same name, in the province of Sindy. It is situate on the Sinde, 58 miles N.E. of Tatta. Lon. 68. 22 E. Lat. 25. 18 N.

To NU'STLE. *v. a.* To fondle; to cherish. See NUZZLE.

NUT. (*nux.*) A seed covered with a shell. Extending not only to nuts, commonly so called, but to the acorn, and all stone-fruits.

NUT-TREE. See CORYLUS.

NUT (Cocoa). The fruit of the cocos nucifera of Linnéus. Within the nut is found a kernel, as pleasant as an almond, and also a large quantity of liquor resembling milk, which the Indians greedily drink before the fruit is ripe, it being then pleasant, but when the nut is matured the liquor becomes sour. Some full grown nuts will contain a pint or more of this milk, the frequent drinking of which seems to have no bad effects upon the Indians; yet Europeans should be cautious of making too free with it at first, for when Lionel Wafer was at a small island in the South Sea, where the tree grew in plenty, some of his men were so delighted with it, that at parting they were resolved to drink their fill, which they did; but their appetites had like to have cost them their lives, for though they were not drunk, yet they were so chilled and benumbed, that they could not stand, and were obliged to be carried aboard by those who had more prudence than themselves, and it was many days before they recovered. The shells of these nuts being hard, and capable of receiving a polish, are often cut transversely, when, being mounted on stands, and having their edges silvered or gilt, or otherwise ornamented, they serve the purpose of drinking cups. The leaves of the tree are used for thatching, for brooms, baskets, and other utensils; and of the reticular web growing at their base the Indian women make cauls and aprons. See COCOS.

NUT (Barbadoes). See RICINUS MAJOR.

NUT (Purging). See RICINUS MAJOR.

NUT (Bladder), in botany. See STAPHYLŒA.

NUT (Cashew), in botany. See ANACARDIUM.

NUT (Chocolate), in botany. See THEOBROMA.

NUT (Fansel), in botany. See ARECA.

NUT (Hazel), in botany. See CORYLUS.

NUT (Malabar), in botany. See JUSTICIA.

NUT (Oil), in botany. See RICINUS.

NUT (Physic), in botany. See JATROPA.

NUT (Pistacia), in botany. See PISTACIA.

NUT (Wall), in botany. See JUGLANS.

NUT, in mechanics, the concave cylindrical spiral which receives a screw.

NUTANT, in botany. See NODDING. *Nuto* properly signifies to nod with the head, or to nod assent. Cicero uses it for nodding to its fall, or being ruinous; also for hesitating or doubting in an opinion.

NUTATION, in astronomy, a kind of libratory notation of the earth's axis; by which its inclination to the plane of the ecliptic is continually varying, by a certain number of seconds, backwards and forwards. The whole extent of this change in the inclination of the earth's axis, or, which is the same thing, in the apparent declination of the stars, is about 19″, and the period of that change is little more than

9 years, or the space of time from its setting out from any point and returning to the same point again, about 18 years and 7 months, being the same as the period of the moon's motions, upon which it chiefly depends; being indeed the joint effect of the inequalities of the action of the sun and moon upon the spheroidal figure of the earth, by which its axis is made to revolve with a conical motion, so that the extremity of it describes a small circle, or rather an ellipse, of 19.1 seconds diameter, and 14''.2 conjugate, each revolution being made in in the space of 18 years 7 months, according to the revolution of the moon's nodes.

This is a natural consequence of the Newtonian system of universal attraction; the first principle of which is, that all bodies mutually attract each other in the direct ratio of their masses, and in the inverse ratio of the squares of their distances. From this mutual attraction, combined with motion in a right line, Newton deduces the figure of the orbits of the planets, and particularly that of the earth. If this orbit were a circle, and if the earth's form were that of a perfect sphere, the attraction of the sun would have no other effect than to keep the earth in its orbit, without causing any irregularity in the position of its axis. But neither is the earth's orbit a circle, nor its body a sphere; for the earth is sensibly protuberant towards the equator, and its orbit is an ellipsis, which has the sun in its focus. Now when the position of the earth is such, that the plane of the equator passes through the centre of the sun the attractive power of the sun acts only so as to draw the earth towards it, still parallel to itself, and without changing the position of its axis; a circumstance which happens only at the time of the equinoxes. In proportion as the earth recedes from those points, the sun also goes out of the plane of the equator, and approaches that of the one or other of the tropics; the semidiameter of the earth, then exposed to the sun, being unequal to what it was in the former case, the equator is more powerfully attracted than the rest of the globe, which causes some alteration in its position, and its inclination to the plane of the ecliptic: and as that part of the orbit, which is comprised between the autumnal and vernal equinox, is less than that which is comprised between the vernal and autumnal, it follows, that the irregularity caused by the sun, during his passage through the northern signs, is not entirely compensated by that which he causes during his passage through the southern signs; and that the parallelism of the terrestrial axis, and its inclination to the ecliptic, is thence a little altered.

The like effect which the sun produces upon the earth, by his attraction, is also produced by the moon, which acts with greater force, in proportion as she is more distant from the equator. Now, at the time when her nodes agree with the equinoxial points, her greatest latitude is added to the greatest obliquity of the ecliptic. At this time therefore, the power which causes the irregularity in the position of the terrestrial axis, acts with the greatest force; and the revolution of the nodes of the moon being performed in 18 years 7 months, hence it happens that in this time the nodes will twice agree with the equinoxial points; and consequently, twice in that period, or once every 9 years, the earth's axis will be more influenced than at any other time.

That the moon has also a like motion, is shewn by Newton, in the first book of the Principia, but he observes indeed that this motion must be very small, and scarcely sensible.

As to the history of the nutation, it seems there have been hints and suspicions of the existence of such a circumstance ever since Newton's discovery of the system of the universal and mutual attraction of matter; some traces of which are found in his Principia, as above mentioned.

We find too, that Flamsteed had hoped, about the year 1690, by means of the stars near his zenith, to determine the quantity of the nutation which ought to follow from the theory of Newton; but he gave up that project because, says he, if this effect exists, it must remain insensible till we have instruments much longer than 7 feet, and more solid and better fixed than mine. Hist. Cœlest. vol. 3, pa. 113.

And Horrebow gives the following passage, extracted from the manuscripts of his master Roemer, who died in 1710, whose observations he published in 1753, under the title of Basis Astronomiæ. By this paragraph it appears that Roemer suspected also a nutation in the earth's axis and had some hopes to give the theory of it: it runs thus; "Sed de altitudinibus non periode certus reddebar, tam ob refractionum varietatem quam ob aliam nondum liquido perspectam causam; scilicet per hos duos annos, quemadmodum et alias, expertus sum esse quandam in declinationibus varietatem, quæ nec refractionibus nec parallaxibus tribui potest, sine dubio ad vacillationem aliquam poli terrestris referendam, cujus me verisimilem dare posse theoriam, observationibus munitam, spero." Basis Astronomiæ, 1735, pa. 66.

These ideas of a nutation would naturally present themselves to those who might perceive certain changes in the declinations of the stars; and we have seen that the first suspicions of Bradley, in 1727, were that there was some nutation of the earth's axis which caused the star γ Draconis to appear at times more or less near the pole; but farther observations obliged him to search another cause for the annual variations (art ABERRATION): it was not till some years after that he discovered the second motion which we now treat of, properly called the nutation.

For the better explaining the discovery of the nutation by Bradley we must recur to the time when he observed the stars in discovering the aberration. He perceived in 1728, that the annual change of declination in the stars near the equinoctial colure was greater than what ought to result from the annual precession of the equinoxes being supposed 50'', and calculated in the usual way; the star η Ursæ Majoris was in the month of September 1728, 20'' more south than the preceding year, which ought to have been only 18''; from whence it would follow that the precession of the equinoxes should be 55''½, instead of 50'', without ascribing the difference between the 18 and 20'' to the instrument, because the stars about the solstitial colure did not give a like difference. Philos. Trans. vol. 35, pa. 659.

In general, the stars situated near the equinoctial colure had changed their declination about 2'' more than they ought by the mean precession of the equinoxes, the quantity of which is very

well known, and the stars near the solstitial colure the same quantity less than they ought: but, Bradley adds, whether these small variations arise from some regular cause, or are occasioned by some change in the sector, I am not yet able to determine. Bradley therefore ardently continued his observations for determining the period and the law of these variations; for which purpose he resided almost continually at Wansted till 1732, when he was obliged to repair to Oxford to succeed Dr. Halley; he still continued to observe with the same exactness all the circumstances of the changes of declination in a great number of stars. Each year he saw the periods of the aberration confirmed according to the rules he had lately discovered; but from year to year he found also other differences; the stars situated between the vernal equinox and the winter solstice approached nearer to the north pole, while the opposite ones receded farther from it: he began therefore to suspect that the action of the moon upon the elevated equatorial parts of the earth might cause a variation or libration in the earth's axis: his sector having been left fixed at Wansted, he often went there to make observations for many years, till the year 1747, when he was fully satisfied of the cause and effects, an account of which he then communicated to the world. Philos. Trans. vol. 45, an. 1748.

"On account of the inclination of the moon's orbit to the ecliptic says Dr Maskelyne, (Astronomical Observations 1776 pa 2), and the revolution of the nodes in antecedentia, which is performed in 18 years and 7 months, the part of the precession of the equinoxes, owing to her action, is not uniform: but subject to an equation, whose maximum is 18": and the obliquity of the ecliptic is also subject to a periodical equation of 9"·55; being greater by 19 1" when the moon's ascending node is in Aries, than when it is in Libra. Both these effects are represented together, by supposing the pole of the earth to describe the periphery of an ellipsis, in a retrograde manner during each period of the moon's nodes, the greater axis, lying in the solstitial colure, being 19·1", and the lesser axis, lying in the equinoxial colure, 14·2"; being to the greater, as the cosine of double the obliquity of the ecliptic to the cosine of the obliquity itself. This motion of the pole of the earth is called the nutation of the earth's axis, and was discovered by Dr. Bradley, by a series of observations of several stars made in the course of 20 years, from 1727 to 1747, being a continuation of those by which he had discovered the aberration of light. But the exact law of the motion of the earth's axis has been settled by the learned mathematicians d'Alembert, Euler, and Simpson, from the principles of gravity. The equation hence arising in the place of a fixed star, whether in longitude, right-ascension, or declination (for the latitudes are not affected by it) has been sometimes called nutation, and sometimes deviation." And again (says the Doctor, pa. 8), the above "quantity 19 1", of the greatest nutation of the earth's axis in the solstitial colure, is what I found from a scrupulous calculation of all Dr Bradley's observations of γ Draconis, which he was pleased to communicate to me for that purpose. From a like examination of his observation of η Ursæ majoris, I found the lesser axis of the ellipsis of nutation to be 14·1", or only $\frac{1}{10}$th of a second less than what it should be from the observations of γ Draconis. But the result from the observations of γ Draconis is most to be depended upon."

Mr. Machin, secretary of the Royal Society, to whom Bradley communicated his conjectures, soon perceived that it would be sufficient to explain both the nutation and the change of the precession, to suppose that the pole of the earth described a small circle. He stated the diameter of this circle at 18", and he supposed that it was described by the pole in the space of one revolution of the moon's nodes. But later calculations and theory have shewn that the pole describes a small ellipsis, whose axes are 19 1" and 14·2", as above mentioned.

To shew the agreement between the theory and observations, Bradley gives a great multitude of observations of a number of stars, taken in different positions; and out of more than 300 observations which he made, he found but 11 which were different from the mean by so much as 2". And by the supposition of the elliptic rotation, the agreement of the theory with observation comes out still nearer.

By the observations of 1740 and 1741, the star η Ursæ majoris appeared to be 3" farther from the pole than it ought to be according to the observations of other years. Bradley thought this difference arose from some particular cause; which however was chiefly the fault of the circular hypothesis. He suspected also that the situation of the apogee of the moon might have some influence on the nutation. He invited therefore the mathematicians to calculate all these effects of attraction, which has been ably done by d'Alembert, Euler, Walmesley, Simpson, and others; and the astronomers to continue to observe the positions of the smallest stars, as well as the largest, to discover the physical derangements which they may suffer, and which had been observed in some of them.

Several effects arise from the nutation. The first of these, and that which is the most easily perceived, is the change in the obliquity of the ecliptic; the quantity of which ought to be varied from that cause by 18" in about 9 years. Accordingly, the obliuity of the ecliptic was observed in 1764 to be 23° 28' 15", and in 1755 only 23° 28' 5": not only therefore had it not diminished by 8", as it ought to have done according to the regular mean diminution of that obliquity; but it had even augmented by 10"; making together 18", for the effect of the nutation in the 9 years.

The nutation changes equally the longitudes, the right-ascensions, and the declinations of the stars, as before observed; it is the latitudes only which it does not affect, because the ecliptic is immoveable in the theory of the nutation.

See farther, Hutton's Dictionary, art. Nutation, and Laplace's System of the World, book iv. chap. 13.

NUTBROWN, *a.* (*nut* and *brown.*) Brown like a nut kept long (*Milton*).

NUTCRACKERS. *s.* (*nut* and *crack.*) An instrument used to enclose nuts, and break them by pressure (*Addison*).

NUTCRACKER, in ornithology. See CORVUS.

NUTGALL. *s.* (from *nut* and *gall.*) The excrescence of an oak.

NUTHATCH, in ornithology. See SITTA.

NUTHOOK. *s.* (*nut* and *hook.*) 1. A

stick with a hook at the end to pull down boughs that the nuts may be gathered. 2. A name of contempt (*Shakspeare*).

NUTMEG. See Nux moschata.

NUTSHELL. *s.* (*nut* and *shell*). 1. The hard substance that encloses the kernel of the nut (*Shakspeare*). 2. It is used proverbially for any thing of little value (*L'Estrange*).

NUTTREE. *s.* (*nut* and *tree.*) A tree that bears nuts: commonly a hazel (*Dryden*).

NUTRICATION *s.* (*nutricatio*, Latin.) Manner of feeding or being fed (*Brown*).

NUTRIMENT. *s.* (*nutrimentum* Latin.) Food; aliment (*South*).

NUTRIMENTAL. *a.* (from *nutriment.*) Having the qualities of food; alimental (*Arbuthnot*).

NUTRITION. *s.* (*nutrition*, French.) 1. The act or quality of nourishing, supporting strength, or increasing growth (*Glanv.*) 2. That which nourishes; nutriment (*Pope*).

Nutrition, in physiology, *accretion*, growth of parts. To this important function almost all other functions, as those of digestion, absorption, circulation, respiration, and the secretions, are only preliminary and preparatory. It is this that gives to every organ, and to the total system, whether animal or vegetable, its ultimate perfection: and which continues that perfection as long as the laws which regulate its stages and duration of existence allow.

Nutrition is therefore the completion of the assimilating functions. The food, changed by a series of decompositions, animalized, and rendered similar to the being which it is designed to nourish, applies itself to those organs the loss of which it is to supply, and this identification of nutritive matter to our organs constitutes nutrition.

The living body is continually losing its constituent parts, which a variety of causes are incessantly carrying off: several of its organs are constantly engaged in separating humours which pass away, loaded with a part of its substance, consumed by the united action of air and caloric: internal friction, agitated by a pulsatory motion, detaches its particles.

Thus the animal machine is continually destroyed, and at distant periods of life does not contain a single particle of the same constituent parts. An experiment made with madder (rubia tinctorum), which, when mixed with the food, reddens the bones of animals, proves in a very decisive manner this perpetual decomposition of living animal matter: entirely to obliterate the diffused red colour of bones, it is only necessary to suspend, for a time, the use of this root. Therefore, if the most compact and solid parts be in a continual motion of decomposition and recomposition, there can be no doubt but that this motion must be more rapid in those parts, the constituent principles of which are in the smallest degree of cohesion, as in fluids. It has been an object of consideration to determine the period of the entire renovation of the body: and it has been said that an interval of seven years was necessary for the same particles to be totally obliterated, and their place supplied by others; but this change should seem to be more rapid in infancy and youth; it should also seem to be retarded in manhood, and require a very long time to be accomplished in old age, when all our parts acquire a remarkable degree of consistence and fixity, at the same time that the vital actions become more languid. There is no doubt but that sex, temperature, climate, profession, mode of living, and a variety of other causes, accelerate and retard this period; so that it is impossible to affirm any thing certain on the precise time of its duration.

In proportion as our parts are destroyed, they are renewed by homogeneous particles, or such as are exactly similar to themselves: otherwise their nature, which is always alike, would suffer continual changes.

When the nutritive matter has been animalized or assimilated to the body, which it is designed to nourish by the organs of digestion, absorption, circulation, respiration, and secretion, the parts which it supplies retain and incorporate it with their own substance.

This nutritive identification is variously effected in different parts, as the brain, muscles, &c. Each of these appropriates to itself, by a true secretion, that which is found analogous to its nature, and rejects the heterogeneous particles brought by different vessels, chiefly by the arteries. A bone is a secretory organ, that becomes incrusted with phosphat of lime; the lymphatic vessels, which, in the work of nutrition, perform the office of excretory ducts, remove this salt after it has remained a certain time in the areola of its texture. It is the same in muscles with respect to the fibrin, and in the brain with albumen; each part imbibes and renders solid in its structure such juices as are of the same nature, in consequence of a power, of which the affinity of aggregation of the chemists gives us an idea, and perhaps furnishes us with an exact model.

A part to acquire nourishment should possess sensibility and motion: a ligature placed in its arteries and nerves, by destroying both these faculties, prevents it from being nourished or having life. The blood flowing in the veins, and the fluid of the absorbents, contain vivifying and reparatory parts in much smaller quantity than the arterial blood: it is even generally believed, that lymph and venous blood do not contain any thing directly nutritious.

The mechanism of nutrition would be explained after having precisely determined the differences of composition that exist between the elements on which we exist and the exact substance of our organs, if we could distinguish how each function divests them of their characters, to invest them with our properties for each individual part, to co-operate in changing their nutritious principle into our own peculiar structure.

To resolve this problem, let us suppose a man living entirely on vegetables, which, in fact, constitute the principal part of the subsistence of the generality of men; whatever portion of the plant he may consume, whether stalk, leaves, flowers, seeds or roots, carbon, hydrogen, and oxygen enter their composition, which may be always, by a strict analysis, resolved into water and carbonic acid: to these three constituent principles sometimes a small quantity of azot, salts, and other things, are united. If we then examine the nature of the organs of this man, whose diet consists exclusively in vegetables, they will be proved of a composition very different from the kind of food employed; azot predominates, although the vegetable substance contain it in a very small quantity, and many new products will be discovered which had not been distinguished in the element, but which

abound in the body receiving nourishment, and seem produced by the act of nutrition.

The essential part of this function, therefore, is to cause the nutritive matter to pass into a more advanced state of composition, to deprive it of a portion of its carbon and hydrogen, to give a predominance of azot, and develop several substances which were not before distinguishable.

Every living body, without exception, seems to possess the faculty of forming and decomposing substances, by the assistance of which it is supported, and of giving rise to new products. The marine plant, the ashes of which form soda, if sown in a box filled with earth that does not contain a particle of that alkali, and moistened with distilled water, furnishes it in as great a quantity as if the plant had been growing on the borders of the sea, in a swampy soil, always inundated by brackish or salt water.

Living bodies, then, are the proper elaboratories in which such combinations and decompositions occur as art cannot imitate; bodies that to us appear simple, as soda and silex, seem to form themselves of other parts, while some bodies, the composition of which we cannot determine, as certain metals, suffer inevitable decomposition: from which we may fairly conclude, that the powers of nature in the composition and decomposition of bodies far surpass the science of chemists.

For a substance to be employed in our nourishment, it should be capable of change and fermentation; that is, susceptible of experiencing an internal and spontaneous motion, by which its elements change their combination and qualities.

This condition of spontaneous mutability excludes from the class of aliment every thing which is not organized, or constituted part of a living being; thus minerals are absolutely refractory to the action of our organs, which cannot convert them into their own peculiar substance. The common principle drawn from alimentary substances, however various they may be, called by Hippocrates the aliment, is probably a composition capable of a great degree of change and fermentation; this is also the opinion of all those who have endeavoured to discover its nature. Lorry thinks it is a mucous body; Cullen considered it saccharine; Halle believes it to be an hydro-carbonated oxyd, which only differs from the oxalic acid by having a smaller portion of oxygen. It is obvious that these three sentiments have the greatest resemblance, since oxigen, carbon, and hydrogen, united in different proportions, form a mucous, a saccharine body, and the oxalic base. The analysis of animal substance by nitric acid reduces to the latter base by taking from it a great quantity of azot, the presence of which constitutes its most remarkable character.

Halle believes that the hydro-carbonated oxyd is combined with oxygen in the stomach and intestinal canal, whether the latter principle be introduced with the food into the primæ viæ, or furnished by the decomposed humours; the intestinal fluids suffer their azot to be disengaged, which is carried to the alimentary base, and replaces the carbon that had been attracted by the oxygen to form the carbonic acid. This gass when in the lungs, and again subjected to the action of atmospheric oxigen, carries off a certain portion of its carbon; and as it disengages the azot from the venous blood, it effects a new combination of this principle with the chyle; and when propelled to the skin, the atmospheric oxygen again disengages its carbon, and completes its azotification: perhaps even the cutaneous organ answers similar purposes to the lymphatic system, as the pulmonary organ may effect to the sanguiferous system.

The animalization of alimentary substance, therefore, takes place principally by the loss of its carbon; which is replaced by azot in animal fluids; these support themselves in a proper state, for, as they are continually losing the carbonic principle in the intestinal, pulmonary, and cutaneous combinations, they would be too much animalized if a newly formed chyle were not to attract the excess of azot. This theory is admitted by its author not to account for the formation of phosphoric salts, adeps, and abundance of other productions: but without adopting it in toto, we are induced to conclude, from the experiments and observations on which it is established, that the oxygen of atmospheric air is one of the most powerful agents employed by nature to convert the aliments on which we subsist into our own peculiar substance.

The proportion of oxygen and carbonic acid contained in the intestinal canal diminishes from the stomach towards the large intestines, while, on the contrary, that of azot increases. Hydrogen is more abundant in the large than in the small intestines; it is found to exist in less quantity in the latter than in the stomach.

This subject has been very lately pursued with a high degree of interest and success in their experiments by those very excellent French chemists MM. Gay-Lusac and Thenard, whose results, together with the very ingenious means by which they were obtained, have been lately read before the French National Institute, and we are happy to have an opportunity of communicating them at this early period in a form so abridged that it does not admit of farther retrenchment.

The first idea that presented itself to the experimenters upon conceiving the project of analyzing animal and vegetable materials, was to transform by means of oxygen the vegetable and animal substances into water, carbonic acid, and azot. It was evident, say they, that if we could succeed in operating the transformation so as to collect all the gasses, this analysis would be accomplished with very great precision and simplicity. Two obstacles presented themselves: one was to burn completely the hydrogen and the carbon of these substances, and the other to operate the combustion in close vessels.

We could expect to surmount the first difficulty only by means of the metallic oxides, which easily give up their oxygen, or by the hyper-oxygenated muriate of potash. Some experiments soon made us give the preference to the above salt, which succeeded beyond all expectation. It was not quite so easy, however, to overcome the latter difficulty; for we could not attempt combustion in a retort full of mercury. To prevent the matter from being burnt, the retort must have been broken: it became necessary to find an apparatus, therefore, in which we might—

1. Burn portions of substance so small as not to fracture the vessels.

2. To make a great number of successive combustions, in order that the results might be perceptible.

3. To collect the gasses as they were formed.

We now exhibit to the class an apparatus of the above description. It is formed of three distinct

pieces: one is a very thick glass tube, closed at its lower extremity by the blow-pipe, and open at its upper end, about two decimetres in length, and eight millimetres in breadth; it has laterally five centimetres from its aperture a very small tube also of glass, which is soldered to it, and which resembles that which we should adapt to a retort for receiving the gasses. The other piece is a copper ferule, into which we insert the open extremity of the large glass tube, and with which it is united by means of a mastic which melts only at 40°. The last piece is a peculiar kind of stopcock, in which the whole merit of the apparatus consists. The key of this stopcock has no hole through it, and turns in every direction without giving vent to the air: there is simply about the middle of it a cavity capable of receiving a small pea: but this cavity is such, that being in its upper position, it corresponds to a small vertical funnel which penetrates the socket, and of which it forms in some measure the extremity of the beak, and which when brought back to its lower position communicates with, and is a continuation of, the body of the stopcock, which is hollow, and is screwed to the ferule. Thus when we put small fragments of any matter into the funnel and turn the key, the cavity is soon filled, and carries the matter into the body of the stopcock, from which it falls into the ferule, and from thence to the bottom of the glass tube.

If this substance, therefore, be a mixture of hyper-oxygenated muriate of potash and of vegetable substance in proper proportions, and if the lower part of the glass tube be sufficiently warm, it will briskly take fire: the vegetable substance will then be instantaneously destroyed and transformed into water and carbonic acid, which will be collected over mercury with the oxygen gass issuing by the small lateral tube.

In order to execute this operation easily, we may conceive that it is necessary that the matter be detached entirely from the cavity and fall to the bottom of the tube. For this purpose it is made up into small balls, as will be mentioned presently: we may also conceive that it is necessary to inquire what is the proper quantity of hyper-oxygenated muriate for burning completely vegetable substance. We must even take the precaution to employ at least one half more than this substance requires, in order that the combustion may be complete.

But of all the inquiries which ought to precede the operation, the most important is the analysis of the hyper-oxygenated muriate employed; for upon this all the calculations of the experiments are in a great measure founded.

All this being well understood, it will be easy to analyse a vegetable substance with the hyper-oxygenated muriate. This substance is to be ground on a porphyry slab with the greatest care, as also the hyper-oxygenated muriate; quantities of both are to be weighed in very accurate scales; they are to be well mixed, moistened, and rolled into cylinders; these are to be divided into small balls, which are to be exposed to a boiling heat, in order to render them as dry as the original materials were. If the substance to be analysed is a vegetable acid, it is to be combined with lime or barytes before mixing it with the hyper-oxygenated muriate: the salt which results is to be analysed, and an account is to be taken of the carbonic acid which remains united to the basis after the experiment; lastly, if the substance to be analysed contains some bodies which are foreign to its nature, they are also to be taken account of.

Thus we know accurately that a given weight of this mixture represents a known weight of hyper-oxygenated muriate, and of the substance which we wish to analyse.

Now in order to finish the operation, nothing more is requisite than to make the bottom of the tube red hot; to drive off all the air by means of a certain number of balls, which we do not weigh, and which we throw in one after another; then to decompose in the same manner a weight of them precisely determined, and carefully to collect all the gasses in flasks full of mercury and guaged beforehand.

If all the flasks are of the same capacity, they will be filled with gass by equal weights of mixture, and if we examine these gasses, we shall find them perfectly identical, an evident proof of the extreme accuracy of this method of analysis.

The tube ought to be kept during the whole operation at the highest degree of heat which it can support without melting, in order that the gasses may not contain any oxy-carburetted hydrogen gass. In all cases the analysis ought to be performed over mercury. This is a proof to which it is indispensable to subject them: for this purpose it is sufficient to mix them with one-fourth of their volume of hydrogen, and to pass an electric spark into them. As they contain a great excess of oxygen, the hydrogen which we add, and of which an account must be kept, burns as well as the whole oxy-carburetted hydrogen which they may contain; and we thus acquire the certainty that they are no longer formed of any thing but carbonic acid and oxygen, which must be separated by potash.

But this necessity of raising the temperature obliges us on the other hand to take some precautions in order that the stopcock may not be heated. With this view the glass tube is passed through a brick to which it is fastened with clay, and which at the same time gives solidity to the apparatus: besides this, we must solder to the body of the stopcock a small hollow cylinder in which water is put, or rather ice.

We have thus all the necessary data for knowing the proportion of the principles of the vegetable substance: we know how much of this substance has been burnt, since we have the weight of it to a demi-milligramme: we know how much oxygen is wanted to transform it into water and into carbonic acid, since the quantity of it is given by the difference which exists between that contained in the hyper-oxygenated muriate and that contained in the gasses: lastly, we know how much carbonic acid is formed, and we calculate how much water ought to be formed.

By following the same order of analysis, we also succeed in determining the proportion of the constituent principles of all the animal substances. But as these substances contain azot, and as there would be a formation of nitrous acid gass, if we employed an excess of hyper-oxygenated muriate in order to burn them, we need only employ a quantity sufficient for reducing them completely into carbonic acid gass, oxy-carburetted hydrogen, and azot, of which we perform the analysis in the eudiometer with mercury by the common methods, and from which we may conclude exactly that of the animal substance itself.

The method in which we proceed to the analysis of vegetable and animal substances being exactly

known, we can tell what quantity of it we decompose without any fear of weakening the confidence which we ought to have in our results. This quantity rises at most to six decigrammes: besides, if there was the smallest doubt as to their exactness, we could get rid of it upon recollecting that we fill successively with gass two, and sometimes three, flasks of the same capacity; that these gasses are identical, and always proceed from one and the same weight of materials.

We might add, that the exactness of any analysis consists rather in the accuracy of the instruments, and of the methods which we employ, than in the quantity of matter upon which we operate. The analysis of the air is more exact than any analysis of the salts, and yet it is performed upon 2 or 300 times less matter than the latter. This is because in the former, where we judge of weights by volumes which are very considerable, the errors which we may commit are perhaps 1000 or 1200 times less perceptible than in the latter, where we are deprived of this resource. Now as we transform into gass the substances which we analyse, we bring our analyses not only to the certainty of the common mineral analyses, but to that of the most precise mineral analyses; more particularly as we collect at least a litre of gass, and as we find even in our way of proceeding the proof of an extreme exactitude and of the most trifling errors.

We have already methodically analysed, with all the precautions just mentioned, sixteen vegetable substances; viz. the oxalic, tartarous, mucous, citric and acetic acids; turpentine in resin; copal, wax, olive oil; sugar, gum, starch, sugar of milk, oak and ash wood, and the crystallisable principle of manna. The results which we obtained seem to us to be of the first rate importance, for they led to three very remarkable laws to which the composition of vegetables is subjected, and which may be thus expressed:

First law.—A vegetable substance is always acid when the oxygen is to the hydrogen in a greater proportion than in water.

Second law.—A vegetable substance is always resinous, oily, or alcoholic, &c. when the oxygen is in a less proportion to the hydrogen than in water.

Third law.—Lastly, a vegetable substance is neither acid nor resinous, and is analogous to sugar, gum, starch, sugar of milk, to the ligneous fibre, to the crystallisable principle of manna when the oxygen is in the same proportion as in water.

Thus, supposing for a moment that hydrogen and oxygen were in the state of water in vegetable substances, which we are far from thinking is the case, the vegetable acids would be formed of carbon, water, and oxygen in various proportions.

The resins, the fixed and volatile oils, alcohol, and ether, would be formed of carbon, water and hydrogen, also in various proportions.

Lastly, sugar, gum, starch, sugar of milk, the ligneous fibre, the crystallisable principle of manna, would only be formed of carbon and water, and would only differ in the greater or less quantity which they contained.

This may be shown by citing various analyses of acid and resinous substances, and of substances which are neither acid nor resinous.

One hundred parts of oxalic acid contain:

Carbon	26·566
Oxygen	70·689
Hydrogen	2·745
	100

Or, rather,

Carbon	26·566
Oxygen and hydrogen in the proportions in which they exist in water	22·872
Oxygen in excess	50·562
	100

One hundred parts of acetic acid contain:

Carbon	50·224
Oxygen	44·147
Hydrogen	5·629
	100

Or, rather,

Carbon	50·224
Oxygen and hydrogen in the proportions in which they exist in water	46·911
Oxygen in excess	2·865
	100

The oxalic acid contain, therefore, more than half its weight of oxygen in excess, in proportion to the hydrogen, whereas in the acetic acid this excess is not quite three centiemes.

These two acids occupy the extremes of the series of the vegetable acids: of all the acids the one is the most, and the other is on the contrary the least oxygenated: this is the reason why it requires so much nitric acid to convert sugar and rum, &c. into oxalic acid; and this is the reason on the contrary, that so many vegetable and animal substances produce so easily acetic acid in a great many circumstances, and that wine in particular is changed into vinegar without any intermediate acid being formed; a phænomenon which had not been hitherto explained, because vinegar has been regarded as the most highly oxygenated of all the acids.

One hundred parts of common resin contain:

Carbon	75·944
Hydrogen and oxygen in the proportions in which they exist in water	15·156
Hydrogen in excess	8·900
	100

One hundred parts of olive oil contain:

Carbon	77·213
Hydrogen and oxygen in the proportions in which they exist in water	10·712
Hydrogen in excess	12·075
	100

One hundred parts of crystallised sugar contain:

Carbon	40·704
Oxygen	52·101
Hydrogen	7·105
	100

Or, rather,

Carbon	40·1904
Hydrogen and oxygen in the proportions in which they are in water	59·806
Oxygen in excess	0·
Hydrogen in excess	0·
	100

One hundred parts of ash wood contain:

Carbon	51·192
Oxygen	5·857
Hydrogen	7·105
	100

Or, rather,

Carbon	51·192
Hydrogen and oxygen in the proportions in which they are in water	48·808
Oxygen in excess	0·
Hydrogen in excess	0·
	100

These results prove a very important fact, viz. that water per se or its principles are seized upon by the vegetable in the act of vegetation: for, all the vegetables being almost entirely formed of ligneous fibres and mucilage, which contain oxygen and hydrogen in the same proportions as water, it is evident that when carried into the substance of the vegetable, it is combined with carbon in order to form them.

If, therefore, it were in our power to unite these two bodies in every given proportion, and to bring their molecules together in a proper manner, we should certainly make all the vegetables which hold the middle rank between the acids and the resins, such as sugar, starch, the ligneous fibres, &c.

Among the animal substances we have only as yet analysed fibrin, albumen, gelatin, and the caseous substance.

It results from our analyses, that in these four substances, and probably in all analogous animal substances, the hydrogen is in a greater proportion to the oxygen than in water; that the greater the excess of hydrogen, the greater is the quantity of azot which they contain also; that these two quantities are almost both in the same proportion as in ammonia, and that it is probable that this proportion, which we nearly approach, does actually exist: the more, probably, because we always find a little too much hydrogen, and as all the errors which we can make tend to increase the quantity of it. We shall judge of this by the two following analyses.

One hundred parts of fibrin contain:

Carbon	51·675
Hydrogen and oxygen in the proportion in which they exist in water	26·607
Hydrogen in excess	5·387
Azot	16·331
	100

One hundred parts of caseous matter contain:

Carbon	57·190
Hydrogen and oxygen in the proportion in which they exist in water	18·778
Hydrogen in excess	5·680
Azot	18·352
	100

Admitting this report to be correct, these substances would correspond, with respect to the rank which they ought to hold among the animal substances, to the rank occupied by sugar, gum, ligneous fibre, &c. among the vegetable substances: for in the same way as hydrogen and oxygen, the gaseous principles of the former may be reciprocally saturated and form water; in the same way hydrogen, oxygen, and azot, the gaseous principles of the latter may be also reciprocally saturated and form water and ammonia: so that the carbon, which is the only fixed principle which all of them contain, does not possess any property relative to that saturation. If we are guided by analogy, we might compare under this point of view the animal acids with the vegetable acids, and the animal fats (if there are any which contain azote) with the resins and vegetable oils: consequently, the hydrogen could not be in a sufficient quantity in the uric acid, for saturating the oxygen and azot which this acid contains, or to form water and ammonia by combining with these two bodies, and the contrary would take place in the animal fats.

NUTRITIOUS. *a.* (from *nutria*, Latin.) Having the quality of nourishing (*Arbuthnot*).

NUTRITIVE. *a.* (from *nutrio*, Lat.) Nourishing; nutrimental; alimental (*Blackmore*).

NUTRITURE. *s.* (from *nutrio*, Lat.) The power of nourishing: not used (*Harvey*).

NUX AQUATICA. See TRIBULUS AQUATICUS.

NUX BARBADENSIS. See RICINUS MAJOR.

NUX BEEN. See BEN NUX.

NUX CATHARTICA AMERICANA. See RICINUS MAJOR.

NUX METELLÆ. See NUX VOMICA.

NUX JUGLANS. See JUGLANS.

NUX MOSCHATA. (*nux, nucis.*) Nucista. Nux myristica. The nutmeg. The seed or kernel of the myristica moschata. Myristica foliis lanceolatis, fructu glabro. Thumb. Class dioecia. Order syngenesia. A spice well known, and which has been long used both for culinary and medical purposes. There are three kinds of unctuous substances, called oil of mace, that are really expressed from the nutmeg. The best is brought from the East Indies in stone jars; this is of a thick consistence, of the colour of mace, and has an agreeable fragrant smell; the second sort, which is paler coloured, and much inferior in quality, comes from Holland in solid masses, generally flat, and of a square figure; the third, which is the worst of all, and usually called common oil of mace, is an artificial composition of suet, palm oil, and the like, flavoured with a little genuine oil of nutmeg. The medicinal qualities of the nutmeg are supposed to be aromatic, anodyne, stomachic, and astringent; and hence it has been much used in diarrhœa and dysenteries. The officinal preparations of nutmeg are a spirit and an essential oil, and the nutmeg in substance, roasted, to render it more astringent: both the spice itself and the essential oil enter several compositions, as the confectio aromatica, spiritus ammoniæ compositus, &c. See MYRISTICA and OIL.

NUX VOMICA. Nux metella. The nux vomica, lignum colubrinum, and faba sancti Ignatii, have been long known in the materia medica as narcotic poisons, brought from the East Indies, while the vegetables which produced them were unknown, or at least not botanically ascertained.

By the judicious discrimination of Linnæus the nux vomica was found to be the fruit of the tree described and figured in the Hortus Malabaricus under the name of caniram, now called strychnos.

To this genus also, but upon evidence less conclusive, he likewise justly referred the colubrinum. But the faba sancti Ignatii he merely conjectured might belong to this family, as appears by the query, an strychni species? which subsequent discoveries have enabled us to decide in the negative; for in the Supp. Plant. it constitutes the new genus Ignatia, which Loureiro has lately confirmed, changing the specific name amara to that of philippinica. The strychnos and Ignatia are however nearly allied, and both rank under the order solanaceæ.

Dr. Woodville has inquired thus far into the botanical origin of these productions, from finding that by medical writers they are generally treated of under the same head, and in a very confused and indiscriminate manner. The seed of the fruit or berry of this tree, strychnos nux vomica, is the officinal nux vomica; it is flat, round, about an inch broad, and near a quarter of an inch thick, with a prominence in the middle on both sides, of a grey colour, covered with a kind of woolly matter; and internally hard and tough like horn. To the taste it is extremely bitter, but has no remarkable smell. It consists chiefly of a gummy matter, which is moderately bitter: the resinous part is very inconsiderable in quantity, but intensely bitter; hence rectified spirit has been considered its best menstruum.

Nux vomica is reckoned amongst the most powerful poisons of the narcotic kind, especially to brute animals; nor are instances wanting of its deleterious effects upon the human species. It proves fatal to dogs in a very short time, as appears by various authorities. Hillefeld and others found that it also poisoned hares, foxes, wolves, cats, rabbits, and even some birds, as crows and ducks; and Loureiro relates, that a horse died in four hours after taking a dram of the seed in an half roasted state.

The effects of this baneful drug upon different animals, and even upon those of the same species, appear to be rather uncertain, and not always in proportion to the quantity of the poison given. With some animals it produces its effects almost instantaneously; with others not till after several hours, when laborious respiration, followed by torpor, tremblings, coma, and convulsions, usually precede the fatal spasms or tetanus, with which this drug commonly extinguishes life.

From four cases related of its mortal effects upon human subjects, we find the symptoms corresponded nearly with those which we have here mentioned of brutes; and these, as well the dissections of dogs killed by this poison, not showing any injury done to the stomach or intestines, prove that the nux vomica acts immediately upon the nervous system, and destroys life by the virulence of its narcotic influence.

The quantity of the seed necessary to produce this effect upon a strong dog, as appears by experiments, need not be more than a scruple; a rabbit has been killed by five, and a cat by four grains: and of the four persons to whom we have alluded, and who unfortunately perished by this deleterious drug, one was a girl ten years of age, to whom fifteen grains were exhibited at twice for the cure of an ague. Loss, however, tells us, that he took one or two grains of it in substance without discovering any bad effect; and that a friend of his swallowed a whole seed without injury.

In Britain, where physicians seem to observe the rule *saltem non nocere* more strictly than in many other countries, the nux vomica has been rarely if ever employed as a medicine.

On the continent, however, and especially in Germany, they have certainly been guided more by the axiom, "What is incapable of doing much harm is equally unable to do much good." The truth of this remark was lately very fully exemplified by the practice of baron Stoerck, and is farther illustrated by the medicinal character given of nux vomica, which, from the time of Gesner till that of a modern date, has been recommended by a succession of authors as an antidote to the plague, as a febrifuge, as a vermifuge, and as a remedy in mania, hypochondriasis, hysteria, rheumatism, gout, and canine madness. In Sweden it has of late years been successfully used in dysentery; but Bergius, who tried its effects in this disease, says, that it suppressed the flux for twelve hours, which afterwards returned again. A woman who took a scruple of this drug night and morning two successive days is said to have been seized with convulsions and vertigo, notwithstanding which the dysenteric symptoms returned, and the disorder was cured by other medicines; but a pain in the stomach, the effect of the nux vomica, continued afterwards for a long time.

Bergius, therefore, thinks it should only be administered in the character of a tonic and anodyne in small doses (from five to ten grains), and not till after proper laxatives have been employed. Loureiro recommends it as a valuable internal medicine in fluor albus; for which purpose he roasts it till it becomes perfectly black and friable, which renders its medicinal use safe without impairing its efficacy.

NUYS, a town of Germany, in the electorate of Cologne. It was taken by the French in 1794; and is seated on the Erfft, five miles S.W. of Dusseldorf, and 20 N.W. of Cologne. Lon. 6. 52 E. Lat. 51. 11 N.

To NU'ZZLE. *v. a.* (corrupted from *nursle.*) 1. To nurse; to foster (*Sidney*). 2. To go with the nose down like a hog (*Arbuth.*).

NYCTALOPIA. (*nyctalopia*, νυκταλωπια, from νυξ, the night, and ωψ, an eye). A defect in vision, by which the patient sees little or nothing in the day, but in the evening and night sees tolerably well. The proximate cause is various: 1. Nyctalopia from a periodical amaurosis, or gutta serena, when the blind paroxysm begins in the morning, and terminates in the evening. 2. Nyctalopia from too great

a sensibility of the retina, which cannot bear the meridian light. 3. Nyctalopia from an opaque spot in the middle of the crystalline lens. When the light of the sun in the meridian contracts the pupil there is blindness; about evening, or in more obscure places, the pupil dilates, hence the rays of light pass through the limbus of the crystalline lens. 4. Nyctalopia, from a disuse of light; thus persons who are educated in obscure prisons see nothing immediately in open meridian light; but by degrees their eyes are accustomed to distinguish objects in day-light. 5. Nyctalopia from an [illegible]veable mydriasis; for in this instance the [illegible] admits too great a quantity of light, which the immobile pupil cannot moderate, hence the patient, in a strong light, sees little or nothing. 6. Nyctalopia from too great a contraction of the pupil. This admits a sufficiency of lucid rays in bright light, but towards night the pupil dilates more, and the patient sees better. 7. Nyctalopia endemica. A whole people have been nyctalops, as the Æthiopians, Africans, Americans, and Asiatics. A great flow of tears are excreted all the day from their eyes; at night they see objects. 8. Nyctalopia from a commotion of the eye; from which a man in the night saw all objects distinctly.

NYCTANTHES. Arabian jasmine. In botany, a genus of the class diandria, order monogynia. Corol salver-shaped, with truncate segments; capsule two-celled, margined. One species only: an Indian shrub, with rugged branches; square stem; leaves opposite, ovate, pointed, entire; corol from six to eight cleft; pericarps membranceous, compressed; seeds fastened to the bottom of the cell. It is a highly ornamental and fragrant plant, and may be increased by layers or cuttings. The flowers are said to open instinctively in the evening and fall off the ensuing day: but this is an error. The natives of Ceylon infuse it in water, and obtain a fragrant and cordial drink; which is also reported to be useful in inflammations of the eyes applied topically. The tube of the flower when dried has the smell of saffron; and being pounded and mixed with sanders wood is used by the natives of the Malabar coast for imparting a grateful fragrancy to their bodies, which they rub or anoint with the mixture.

NYCTASTRATEGI, among the ancients, were officers appointed to prevent fires in the night, or give alarm and call assistance when a fire broke out.

NYCTEUS. The most remarkable of this name is, a son of Neptune by Celene, daughter of Atlas, king of Lesbos, or of Thebes, according to the more received opinion. He married a nymph of Crete, called Polyxo or Amalthæ, by whom he had two daughters, Nyctimene and Antiope. The first of these disgraced herself by her criminal amours with her father, into whose bed she introduced herself by means of her nurse. When the father knew the incest he had committed, he attempted to stab his daughter, who was immediately changed by Minerva into an owl. Nycteus made war against Epopeus, who had carried away Antiope, and died of a wound which he had received in an engagement. See ANTIOPE.

NYCTICORAX, night-raven. See ARDEA.

NYCTOBASIS. (from νυξ, the night, and βαινω, to walk.) Somnambulism. Sleep-walking.

NYL-GHAW. See ANTELOPE.

NYMPH, in mythology, an appellation given to certain inferior goddesses, inhabiting the mountains, woods, waters, &c. said to be the daughters of Oceanus and Tethys. All the universe was represented as full of these nymphs, who are distinguished into several ranks or classes. The general division of them is into celestial and terrestrial; the former of which were called uraniæ, and were supposed to be intelligences that governed the heavenly bodies or spheres. The terrestrial nymphs, called epigeiæ, presided over several parts of the inferior world; and were divided into those of the water, and those of earth. The nymphs of the water were the oceanitides, or nymphs of the ocean; the nereids, the nymphs of the sea; the naiads and ephydriades, the nymphs of the fountains; and the limniades, the nymphs of the lakes. The nymphs of the earth were the oreades, or nymphs of the mountains; the napææ, nymphs of the meadows; and the dryads and hamadryads, who were nymphs of the forests and groves. Besides these, we meet with nymphs who took their names from particular countries, rivers, &c. as the Cithæroniades, so called from mount Cithæron in Bœotia; the Dodonides, from Dodona; Tiberiades, from the Tiber, &c.—Goats were sometimes sacrificed to the nymphs; but their constant offerings were milk, oil, honey, and wine.

They were supposed to enjoy longevity, but not to be immortal. They were believed to delight in springs and fountains. They are described as sleepless, and as dreaded by the country people. They were susceptible of passion. The Argonants, it is related, landing on the shore of the Propontis to dine in their way to Colchos, sent Hylas, a boy, for water, who discovered a lonely fountain, in which nymphs Eunica, Malis, and Nycheia were preparing to dance; and these seeing him were enamoured, and, seizing him by the hand as he was filling his vase, pulled him in. The deities, their copartners in the cave, are such as presided with them over rural and pastoral affairs.

NYMPH, among the naturalists, that state of winged-insects between their living in the form of a worm and their appearing in the winged or most perfect state. The eggs of insects are first hatched into a kind of worms or maggots; which afterwards pass into the nymph-state, surrounded with shells or cases of their own skins: so that, in reality, these nymphs are only the embryo wrapped up in this covering; from whence they at last get loose, though not without great difficulty. During this nymph-state the creature loses its motion. Swammerdam calls it nympha aurelia, or simply aurelia; and others

give it the name of chrysalis, a term of the like import. See the article CHRYSALIS.

NYMPHÆ. (*nympha*, from νυμφη, a water nymph; so called because it stands in the water-course). Labia minora. In anatomy, two membranous folds, situated within the labia majora, at the sides of the entrance of the vagina uteri.

NYMPHÆA. Water-lily. In botany, a genus of the class polyandria, order monogynia. Calyx four or five leaved; petals numerous; stigma radiate, sessile; berry superior, many-celled; the cells many-seeded. Eight species, of which the following are the chief:

1. N. lutea. Yellow water-lily. Leaves heart-shaped, very entire; calyx five-leaved, longer than the petals; stigma very entire. A native of the stagnant waters of our own country. There is another variety, with a toothed stigma, and petiole semicylindrical at the base, two-edged at the top. Linnéus asserts that swine are fond of its leaves and roots; and that its smoke will drive away crickets and cock-roaches out of houses.

2. N. alba. White-water lily. Leaves heart-shaped, very entire; calyx four-leaved; stamens placed on the germ, stigma many-cleft. Like the former, common to the stagnant waters of our own country. The root is tuberous, and has an astrigent and bitter taste. According to Linnéus, the flower raises itself out of the water and expands about seven o'clock in the morning, and closes again, reposing upon the surface, about four in the evening.

3. N. lotus. Egyptian water-lily. Leaves heart-shaped, acutely toothed, a little downy underneath; the lobes approximate, acute; calyx four-leaved. It resembles N. alba very much in the form of its flower, but is a little toothed about the edge. A native of the hot parts of the East Indies, Africa, and America, flowering about the middle of September, near Cairo, in Lower Egypt. The Arabians call it naphar. A bread was formerly made of the seed when dried and ground. At present, there is a variety that produces a round root like that of the potatoe, upon which the inhabitants of the banks of the lake Menzale feed very generally. The flower of the lotus is truly majestic: the rivers about Damietta are covered with it, rising upwards of two feet about the water.

The peltated water-lily was formerly arranged under this genus, by the name of N. nelumbo. Its difference however is sufficient to entitle it to be regarded as a distinct genus; and is now commonly described under the name of NELUMBIUM, to which we refer our readers.

NYMPHÆUM, a port of Macedonia.

NY'MPHISH. *a.* (from *nymph*). Relating to nymphs; lady-like (*Drayton*).

NYMPHION, in the entomology of Fabricius, a tribe of the genus PHALANGIUM, which see.

NYMPHOMANIA. (*nymphomania*, νυμφομανια, from νυμφα, nympha, and μανια, madness). Furor uterinus. A genus of disease in the class locales and order dysorexia of Cullen, characterised by excessive and violent desire for cohabitation in females.

NYMPHOTOMIA. (*nymphotomia*, νυμφοτομια, from νυμφα, the nympha, and τεμνω, to cut). The operation of removing the nymphæ when too large.

NYON, a commercial town of Switzerland, in the capital of a bailiwic of the same name, with a castle. Here are a great many Roman inscriptions. It is seated near the lake of Geneva, 10 miles N N E. of that city. Lon. 6. 12 E. Lat. 46. 21 N.

NYONS, a town of F[illegible]e, in the department of Drome, seated a[illegible] foot of a chain of mountains, on the river Aigues, with a lofty bridge of one arch, the work of the Romans. Here is a mineral spring, named Pontias, and some manufactures of soap and woollen stuffs. It is eight miles N.W. of Buis. Lon. 5. 15 E. Lat. 44. 26 N.

NYS. (A corruption of *ne is*.) None is; not is: obsolete (*Spenser*).

NYSLOT, a strong town of Russia, in the government of Livonia, with a castle. It is seated on the Narova, among large marshes, 20 miles S.W. of Narva, and 60 N. of Wiburg. Lon. 29. 10 E. Lat. 61. 56 N.

NYSSA, in botany, a genus of the polygamia dioecia class and order. Natural order of holoraceæ. Elæagni, Jussieu. Essential character: calyx five parted; corolla none: male, stamens ten: hermaphrodite, stamens five; pistil one; drupe inferior. There are two species, viz. N. integrifolia, mountain tupelo; and N. denticulata, water tupelo; the former of which grows naturally in Pennsylvania, rising to the height of thirty or forty feet, and nearly two in diameter, sending off many horizontal and often depending branches; leaves of a dark green colour on the upper surface, but lighter underneath; the flowers are produced upon long footstalks, from the base of the young shoots, dividing irregularly into several parts, each supporting a small flower; the female trees have fewer flowers, produced upon much longer simple cylindrical footstalks. The Virginian water tupelo tree grows naturally in wet swamps, or near large rivers in Carolina and Florida, rising with a strong upright trunk to the height of eighty or an hundred feet, dividing into many branches towards the top; the leaves are large, of an oval spear-shaped form; the berries are nearly the size and shape of small olives, and are preserved by the French inhabitants upon the Mississippi, where it abounds, and is called the olive tree.

NYSTADT, a town of Sweden, in Finland, with a commodious harbour, and a considerable trade in all kinds of wooden vessels. In 1721 a peace was concluded here, between the emperor of Russia and the king of Sweden. It is seated on a bay of the gulf of Bothnia, 55 miles N.W. of Abo. Lon. 21. 1 E. Lat. 61. 10 N.

NYSTAGMUS. (*nystagmus*, νυσταγμος, from νυσταω, to sleep). A twinkling of the eyes, such

as happens when a person is very sleepy. Authors also define nystagmus to be an involuntary agitation of the ocnlary bulb. It is known by the instability or involuntary and constant motions of the globe of the eye from one canthus to another, or in some other directions. Sometimes it is accompanied with an hippus, or an alternate and repeated dilatation and constriction of the pupil. The species are, 1. Nystagmus from fear. This agitation is observed under the operation for the cataract; and it is checked by persuasion, and waiting a short space of time. 2. Nystagmus from sand or small gravel falling in the eye. 3. Nystagmus from a catarrh, which is accompained with inflammation. 4. Nystagmus from saburra in the primæ viæ, as is observed in infants afflicted with worms, and is known by the signs of saburra. 5. Nystagmus symptomaticus, which happens in hysteric, epileptic, and sometimes in pregnancy, and is a common symptom accompanying St. Vitus's dance.

NYSTED, or NYESTED, a town of Denmark, in the island of Laland, which carries on a considerable trade to the duchy of Mecklenberg and other provinces of Germany. Lon. 11. 40 E. Lat. 54. 43 N.

O.

O The 14th letter and fourth vowel of our alphabet; pronounced as in the words *nose*, *rose*, &c. The sound of this letter is often so soft as to require it double, and that chiefly in the middle of the words; as *goose*, *reproof*, &c. And in some words this *oo* is pronounced like *u* short, as in *flood*, *blood*, &c.

As a numeral, O was sometimes used for 11 among the ancients; and with a dash over it thus, Ō, for 11,000.

In the notes of the ancients, O. CON. is read *opus conductum*; O. C. Q. *opera consilioque*; O. D. M. *operæ, donum munus*; and O. L. O. *opus locatum*.

The O by its long and short pronunciations represents fully the omega and omicron of the Greeks; the pronunciation whereof was very different, says Caninius after Terentianus; for the omega was pronounced in the hollow of the mouth with a great and full sound, including two *oo*; and the omicron upon the edge of the lips with a clearer and smaller sound. These two pronunciations they have in the French tongue; the long O they distinguish by the addition of an S, as *coste*, *hoste*, *motte*; or by the diphthong *au*, as *haute*, *faute*, &c. and the affinity there is between this vowel O and the diphthong *au*, is not without an example in the Greek tongue, where we have αυλαξ or ωλαξ, *sulcus*; τραυμα or τρωμα, *vulnus*, according to the Doric dialect, from whence the Latins have also used *caudex* and *codex*; *caurus* or *corus*, &c. And hence, perhaps, it is, that as this diphthong *au* retains much of the A, so the O has some affinity with the A; for the Eolians used στροτος for στρατὸς, *exercitus*; ονω for ανω, *supra*; which was also imitated by the Romans, who took *Domo* from δαμω, and used *fabius* for *fovius*, according to Festus, *farreus* for *forreus*, &c. And in the French tongue the A and the O are often joined together in the same word, as in *laon*, *faon*, *paon*, which are pronounced with A long, as *lân*, *fân*, *pân*; though Ramus says, that in his time some distinguished the long O by these two letters A O, which they did perhaps in imitation of the Greeks, who changed αο or αω as well as οα in their contractions into ω.

Again, the O has some affinity with the E, whence it is that the Greeks from λεγω *dico*, made λελόγα *dixi*, and the like; that the Etolians used τρομεω for τρεμω *tremo*; and the Latins from σπενδω, made *spondeo*; from *pendeo*, *pondus*; from *tego*, *toga*; and they used to say *adversùm* or *advorsùm*; *vertex* or *vortex*; *accipiter* for *accipitor*, a bird of prey; *hemo* for *homo*; *ambe* and *ambes* for *ambo* and *ambos*, in *Ennius*. But the O had still a greater affinity with the U, whence the ancients, as Longus says, easily confounded these two letters, and though they writ *consol*, they pronounced it *consul*: Cassiodorus also informs us, they wrote *præstu* for *præsto*; *poblicum* for *publicum*; *colpam* for *culpam*. Pliny in Priscian says the same thing; and thence it comes to pass that *huc*, *illuc*, are used for *hoc*, *illoc*, and this Virgil himself does:

Hoc tunc ignipotens cælo descendit ab alto. Æn. 8.

Quintilian also observes, that they used *hecol·a*, and *notrix* with an O for an U; and that of *Odysseus*, the Eolians had made *Udysses*, from whence the Romans said *Ulysses*; and that, in short, his masters wrote *servom* with an O, whereas from his time forward they wrote the same with two *uu*'s, *servum*. The two diphthongs *oe* and *oi* come near the Greek diphthong οι: the O among the Latins was very like unto the V; wherefore it often happened that the *œ* was changed into an *u*, as when from the word *pœna* they made *punire*; and thus we may still find in some old inscriptions *oisum* or *œsum* put for *usum*, *coiravit* or *cœravit* for *eurovit*; *mœnera* for *munera*; and so also they used *puni* for *pœni*, and *bellum punicum* for *pœnicum*.

O is usually denoted long by a servile *a* subjoined, as *moan*; or by *e* at the end of the syllable, as *bone*; when these vowels are not used, it is generally short.

Among the Irish, the letter O, at the beginning of the name of a family, is a character of dignity annexed to great houses. Thus, in the history of Ireland, we frequently meet with the O Neals, O Carrols, &c. considerable houses in that island.

Cambden observes, that it is the custom of the lords of Ireland to prefix an O to their names to distinguish them from the commonalty.

The ancients used O as a mark of triple time; from a notion that the ternary, or number 3, was the most perfect of numbers, and therefore properly expressed by a circle, the most perfect of figures.

It is not, strictly speaking, the letter O, but the figure of a circle O, or a double C Ɔ, by which the modern ancients in music used to express what they called *tempo perfecto*, or triple time. Hence the Italians call it *circolo*.

The seven antiphones, or alternate hymns of seven verses, &c. sung by the choir in the time of Advent, were formerly called O, from their beginning with such an exclamation.

O is an adverb of calling, or interjection of sorrow or wishing.

OAF. *s.* (for *oupke.*) 1. A changeling; a foolish child left by the fairies (*Drayton*). 2. A dolt; a blockhead; an idiot.

OAFISH. *a.* (from *oaf.*) Stupid; dull; doltish.

OA'FISHNESS. *s.* (from *oafish.*) Stupidity; dulness.

OAK, in botany. See QUERCUS.

OAK (Evergreen.) See QUERCUS.

OAK (Jerusalem.) See CHENOPODIUM.

OAK (Poison.) See RHUS.

OAK LEATHER, in botany. See XYLOSTROMA.

O'AKEN. *a.* (from *oak.*) Made of oak; gathered from oak (*Arbuthnot*).

OAKHAM, or OKEHAM, the county-town of Rutlandshire, with a market on Saturday. Near the church remain the decaying walls of an old castle; and four silver pennies of the later Mercian kings were found here in 1749. It is seated in the centre of a fertile valley, called the Vale of Catmose, 28 miles S. by E. of Nottingham, and 98 N. by W. of London. In 1801 the number of houses was 707, of inhabitants 3400. Lon. 0. 46 W. Lat. 52. 42 N.

OAKHAMPTON, or OCKHAMPTON, a borough in Devonshire, with a market on Saturday. It sends two members to parliament, is governed by a mayor, and has large remains of a castle, dismantled by Henry VIII. It is seated on the river Ock, 24 miles W. of Exeter, and 195 W. by S. of London. Lon. 4. 5 W. Lat. 50. 48 N.

OAKS CREEKS. See CANIADERAGO.

OAKUM, OCKHAM, in the sea-language, denotes the matter of old ropes untwisted, and pulled out again into loose hemp, like hurds of flax, to be used in the cauking of ships.

OAR, in navigation, a long piece of timber, flat at one end, and round or square at the other, whereby a boat, barge, galley, &c. is rowed, or advanced along the water.

That part of the *oar* which is out of the vessel, and which enters into the water, is called the blade, or wash; and that which is withinboard is termed the loom, whose extremity, being small enough to be grasped by the rowers, is called the handle.

In a vessel with oars, the water is to be considered as the point of support, or fulcrum; the oar as a lever; the boat as the burden to be moved, and the rower's hand as the moving power. See LEVER, and MECHANIC POWER.

The burden is to be considered as applied to that point of the lever where the oar rests on the boat; which point in large vessels is called the row-port, but in lighters and boats it is always termed the row-lock. The greater, therefore, the distance of the hand from that point, and the less the distance of the water from that point, the greater effect will the oars have.

For the most ingenious theory of the action of oars with which we are acquainted, with a table shewing the number of rowers, the velocity of the vessel, and the proportion between the two parts of the oar within and without the vessel, see the supplement to Euler's Théorie Complette de la Construction et de la Manœuvre des Vaisseaux, or the translation by colonel Watson.

To OAR. *v. n.* (from the noun.) To row.

To OAR. *v. a.* To impel by rowing (*Shakspeare.*)

OARISTUS, or OARISTYS, a term in the Greek poetry, signifying a dialogue between a husband and his wife; such as that in the sixth book of the Iliad, between Hector and Andromache.

Scaliger observes, that the oaristus is not properly any particular little poem, or entire piece of poetry; but always a part of a great one. He adds, that the passage now cited in Homer is the only proper oaristus extant in the ancient poets.

OA'RY. *a.* (from *oar.*) Having the form or use of oars (*Milton*).

OAST. *s.* A kiln: not in use (*Mortimer*).

OAT, in botany. See AVENA.

OATCA'KE. *s.* (*oat* and *cake.*) Cake made of the meal of oats (*Peacham*).

OA'TEN. *a.* (from *oat.*) Made of oats; bearing oats (*Shakspeare*).

OATH, an affirmation or promise, accompanied with an invocation of God to witness what we say; and with an imprecation of his vengeance, or a renunciation of his favour, if what we affirm be false, or what we promise be not performed. The laws of all civilized states have required the security of an oath for evidence given in a court of justice, and on other occasions of high importance; and the Christian religion utterly prohibits swearing, except when oaths are required by legal authority. Indeed no serious and reflecting theist, whether he admit the truth of revelation or not, can look upon swearing on trivial occasions as any thing else than a sin of a very heinous nature. To call upon that infinite and omnipresent Being, who created and sustains the universe, to witness all the impertinence of idle conversation, of which great part is commonly uttered at *random*, betrays a spirit so profane, that nothing short of experience could make us believe it possible for a creature endowed with reason and reflection to be habitually guilty of a practice so impious. No man can plead in extenuation of this crime, that he is tempted to swear by the importunity of any appetite or passion implanted in the human breast: for the utterance of a profane oath communicates no pleasure, and removes no uneasiness; it neither elevates the speaker, nor depresses the hearer.

Quakers and Moravians, swayed by these considerations, and by the sense which they put upon certain texts of scripture, refuse to swear upon any occasion, even at the requisition of a magistrate, and in a court of justice. These scruples are groundless; and seem to proceed from not distinguishing between the proper use and abuse of swearing. It is unquestionably impious to call upon God to witness impertinences, or to use his tremendous name as a mere expletive in conversation; but it by no means follows, that we may not piously call upon him to witness truths of im-

portance, or invoke his name with reverence and solemnity. No individual could, without gross profaneness, pray for a thousand times more wealth than he may ever have occasion to use; but it was never thought profane to pray "day by day for our daily bread, for rain from heaven, and fruitful seasons." If it be lawful to ask of God these earthly blessings, because he alone can bestow them; it cannot surely be unlawful, where the lives or properties of our neighbours, or the security of government is concerned, to invoke him with reverence to witness the truth of our assertions, or the sincerity of our intentions; because of our truth in many cases, and of our sincerity in all, none but he can be the witness.

The text of scripture upon which the Quakers chiefly rest their argument for the unlawfulness of all swearing under the gospel, is our Saviour's prohibition, (Mat. v. 34.): "I say unto you, swear not at all." But whoever shall take the trouble of turning over his bible, and looking at the context, will perceive, that it is only in ordinary conversation, and by no means in courts of justice, that our Lord prohibits his followers from swearing at all. There is no evidence whatever, that swearing by heaven, by the earth, by Jerusalem, or by their own heads, was the form of a judicial oath in use among the Jews. On the contrary, we are told by Maimonides, that "if any man swear by heaven or by earth, yet this is not an oath;" which surely he could not have said, had such been the forms of judicial swearing. Indeed they could not have admitted such forms into their courts without expressly violating the law of Moses, who commands them to "Fear the Lord (Jehovah) their God, to serve him, and to swear by his name." But the Jews, as every one knows, had such a reverence for the name Jehovah, that they would not pronounce it on slight occasions, and therefore could not swear by that name in common conversation. Hence, to gratify their propensity to common swearing, they invented such oaths as, by heaven, by earth, by Jerusalem, by the life of thy head, &c. and by this contrivance they thought to avoid the guilt of profaning the name of Jehovah. These, however, being appeals to insensible objects, either had no meaning, or were in fact, as our Saviour justly argues, oaths by that God whose creatures they were; so that the Jew who swore them was still guilty of profaneness towards the very Jehovah whose name his superstition would not permit him to pronounce. But what puts it beyond all doubt that the use of judicial oaths is not wholly prohibited in the gospel, is the conduct of our Saviour himself as well as of his apostle St. Paul. When Jesus was simply asked by the high priest, what it was which certain false witnesses testified against him; we are told by the evangelist, that "he held his peace:" but being adjured by the living God to declare whether he was the Christ, the Son of God, or not; he immediately answered the high-priest, without objecting to the oath (for such it was) upon which he was examined. St. Paul, in his Epistle to the Romans, says, "God is my witness, that, without ceasing, I make mention of you in my prayers;" and to the Corinthians, still more strongly, "I call God for a record upon my soul, that, to spare you, I came not as yet to Corinth." Both these expressions are of the nature of oaths; and the author of the Epistle to the Hebrews speaks of the custom of swearing judicially without any mark of censure or disapprobation: "Men verily swear by the greater; and an oath for confirmation is to them an end of all strife."

But though a nation has an undoubted right to require the security of an oath upon occasions of real importance, we do not hesitate to say, that, in our opinion, it is something worse than bad policy to multiply oaths, and to hold out to the people temptations to perjure themselves. The security which an oath affords depends entirely upon the reverence which attaches to it in the mind of him by whom it is given; but that reverence is much weakened by the frequency of oaths, and by the careless manner in which they are too often administered. Dr. Paley observes, with truth, that "the levity and frequency with which oaths are administered, has brought about a general inadvertency to the obligation of them, which both in a religious and political view is much to be lamented: and it merits (continues he) public consideration, whether the requiring of oaths on so many frivolous occasions, especially in the customs, and in the qualification for petty officers, has any other effect than to make them cheap in the minds of the people. A pound of tea cannot travel regularly from the ship to the consumer without costing half a dozen oaths at least; and the same security for the due discharge of his office, namely that of an oath, is required from a churchwarden and an archbishop, from a petty constable and the chief justice of England. Let the law continue its own sanctions, if they be thought requisite; but let it spare the solemnity of an oath: and where it is necessary, from the want of something better to depend upon, to accept a man's own word or own account, let it annex to prevarication penalties proportioned to the public consequence of the offence."

That these pernicious consequences of frequent oaths are not felt only in England, we have the evidence of another respectable writer, whose acuteness well qualified him to observe, whilst his station in society furnished him with the best opportunities of observing the effects of repeated swearing upon the morals of Scotchmen. "Customhouse oaths (says Lord Kames) have become so familiar among us, as to be swallowed without a wry face; and is it certain that bribery and perjury in electing parliament members are not approaching to the same cool state? men creep on to vice by degrees. Perjury in order to support a friend

has become customary of late years; witness fictitious qualifications in the electors of parliament men, which are made effectual by perjury: yet such is the degeneracy of the present times, that no man is the worse thought of upon that account. We must not flatter ourselves, that the poison will reach no farther: a man who boggles not at perjury to serve a friend, will in time become such an adept, as to commit perjury in order to ruin a friend when he becomes an enemy."

Besides the frequency of oaths, we have mentioned the irreverent manner in which they are too often administered as one of the causes which make them cheap in the estimation of the people. In this view, the form of the oath, and the ceremonies with which it is required to be taken, are of considerable importance. "The forms of oaths in Christian countries (says Dr. Paley) are very different; but in none, I believe, worse contrived either to convey the meaning or to impress the obligation of an oath, than in England. In that country the juror, after repeating the promise or affirmation which the oath is intended to confirm, adds, 'so help me God;' or more frequently the substance of the oath is repeated to the juror by the officer or magistrate who administers it; adding in the conclusion, 'so help you God.' The energy of the sentence resides in the particle *so*; *so*, i.e. *hac lege*, 'upon condition of my speaking the truth, or performing this promise, may God help me, and not otherwise.' The juror, whilst he hears or repeats the words of the oath, holds his right hand upon a Bible, or other book containing the four gospels. The conclusion of the oath sometimes runs, 'ita me Deus adjuvat; et hæc santa evangelia,' or, 'so help me God, and the contents of this book;' which last clause forms a connexion between the words and action of the juror, which before was wanting. The juror then kisses the book."

This obscure and elliptical form, the excellent author justly observes, is ill calculated to impress the juror with reverence: and he seems to think great preference due to the form of judicial oaths in Scotland. See Paley's Moral Philosophy.

OATH (Coronation.) See KING.

OATHABLE. *a.* (from *oath*. A word not used) Capable of having an oath administered (*Shakspeare*).

OATHBRE'AKING. *s.* (*oath* and *break.*) Perjury; the violation of an oath (*Shakspeare*).

OA'TMALT. *s.* (*oat* and *malt.*) Malt made of oats (*Mortimer*).

OA'TMEAL. *s.* (*oat* and *meal.*) Flour made by grinding oats (*Arbuthnot*).

OB, in compound botanical terms, and frequently in compound terms of other branches of natural history, is put for obverse or inversely.

OBADIAH, or, THE PROPHECY OF OBADIAH, a canonical book of the Old Testament, which is contained in a single chapter, and is partly an invective against the cruelty of the Edomites, who mocked and derided the children of Israel, as they passed into captivity; and, with other enemies, their confederates, invaded and oppressed those strangers, and divided the spoil amongst themselves: and partly a prediction of the deliverance of Israel, and of the victory and triumph of the whole church over her enemies.

OBADIAH, the prophet, is believed to have been the same with the governor of Ahab's house, mentioned in the first book of Kings (xviii. 3, &c.) who hid and fed the hundred prophets whom Jezebel would have destroyed; and some say, that he was that Obadiah whom Josiah made overseer of the works of the temple, (2 Chron. xxxiv. 12.) The truth is, that when he lived or prophesied is wholly uncertain: though most writers make him cotemporary with Hosea, Amos, and Joel.

OBADIAH, a valiant man of David's army, who came to join him in the wilderness, with several others of the tribe of Gad, (1 Chron. xii. 9.) This was also the name of one of those whom king Jehoshaphat sent into the cities of Judah to instruct the people in their religion, (2 Chron. xvii. 7.) It was also the name of one of the principal men of Judah, who signed the covenant that Nehemiah renewed with the Lord, (Nehem. x. 5.)

OBAMBULA'TION. *s.* (*obambulatio*, Lat.) The act of walking about.

OBCONIC NECTARY. An inversely conical nectary, such as we find in narcissus minor.

OBCORDATE PETAL. An inversely heart-shaped petal, having the apex downwards, as in the class monadelphia.

OBCORDATE LEGUME. An inversely heart-shaped legume; as in polygala.

OBCORDATE SILICLE. An inversely heart-shaped sillicle; as in thlaspi bursa pastoris, or shepherd's purse.

OBDACH, a town of Germany, in the duchy of Stiria, seated at the confluence of the Achza and Traun, three miles below the lake Chienzee, and 35 W. of Gratz. Lon. 14. 43 E. Lat. 47. 3 N.

To OBDU'CE. *v. a.* (*obduco*, Latin.) To draw over as a covering (*Hale*).

OBDU'CTION. *s.* (from *obductio*, *obduco*, Latin.) The act of covering, or laying a cover.

OBDU'RACY. *s.* (from *obdurate.*) Inflexible wickedness; impenitence; hardness of heart (*South*).

OBDU'RATE. *a.* (*obduratus*, Latin.) 1. Hard of heart; inflexibly obstinate in ill; hardened; impenitent (*Shaks.*). 2. Hardened; firm; stubborn (*South*). 3. Harsh; rugged (*Swift*).

OBDU'RATELY. *ad.* (from *obdurate.*) Stubbornly; inflexibly; impenitently.

OBDU'RATENESS. *s.* (from *obdurate.*) Stubbornness; inflexibility; impenitence.

OBDURA'TION. *s.* (from *obdurate.*) Hardness of heart; stubbornness (*Hooker*).

OBDU'RED. *a.* (*obduratus*, Lat.) Hardened; inflexible; impenitent (*Milton*).

OBE'DIENCE. *s.* (*obedience*, Fr.) Obsequiousness; submission to authority (*Bacon*).

OBE'DIENT. *a.* (*obediens*, Latin.) Submissive to authority; compliant with command or prohibition; obsequious (*Tillotson*).

OBEDIE'NTIAL. *a.* (*obedientiel*, French.) According to the rule of obedience (*Wake*).

OBE'DIENTLY. *ad.* (from *obedient.*) With obedience (*Tillotson*).

OBE'ISANCE. *s.* (*obeisance*, French.) A bow; a courtesy; an act of reverence made by inclination of the body or knee (*Shakspeare*).

OBELISK, in architecture, a truncated, quadrangular, and slender pyramid, raised as an ornament, and frequently charged either with inscriptions or hieroglyphics. Obelisks appear to be of very great antiquity, and to have been first raised to transmit to posterity precepts of philosophy, which were cut in hieroglyphical characters: afterwards they were used to immortalize the great actions of heroes, and the memory of persons beloved. The first obelisk mentioned in history was that of Ramases king of Egypt, in the time of the Trojan war, which was 40 cubits high. Phius, another king of Egypt, raised one of 55 cubits; and Ptolemy Philadelphus, another of 88 cubits, in memory of Arsinoë. Augustus erected one at Rome in the Campus Martius, which served to mark the hours on an horizontal dial, drawn on the pavement. They were called by the Egyptian priests the fingers of the sun, because they were made in Egypt also to serve as styles or gnomons to mark the hours on the ground. The Arabs still call them Pharaoh's needles; whence the Italians call them *aguglia*, and the French *aiguilles*.

The famous obelisks called the devil's arrows, now reduced to three, the fourth having been taken down in the last century, stand about half a mile from the town of Boroughbridge, to the south-west, in three fields, separated by a lane, 200 feet asunder, nearly on high ground sloping every way. Mr. Drake urges many arguments for their Roman antiquity, and plainly proves them to be natural, and brought from Plumpton quarries about five miles off, or from Ickly 16 miles off. The cross in the town, 12 feet high, is of the same kind of stone. The easternmost or highest is 22 feet and an half high by four broad, and four and an half in girth; the second 21 and an half by 55 one fourth; the third 16 and an half by 64. Stukeley's measures differ. The flutings are cut in the stone, but not through: the tallest stands alone, and leans to the south. Plot and Stukeley affirm them to be British monuments, originally hewn square. Dr. Gale supposed that they were Mercuries, which have lost their heads and inscriptions; but in a MS. note in his Antoninus, he acknowledges that he was misinformed, and that there was no cavity to receive a bust.

On the north side of Penrith in the churchyard are two square obelisks, of a single stone each, 11 or 12 feet high, about 12 inches diameter and 12 by 8 at the sides, the highest about 18 inches diameter, with something like a transverse piece to each, and mortised into a round base. They are 14 feet asunder, and between them is a grave inclosed between four semicircular stones of the unequal lengths of five, six, and four and an half, and two feet high, having on the outsides rude carving, and the tops notched. This is called the Giant's grave, and ascribed to sir Ewan Cæsarius, who is said to have been as tall as one of the columns, and capable of stretching his arms from one to the other, to have destroyed robbers and wild boars in Englewood forest, and to have had an hermitage hereabouts called sir Hugh's parlour; but the conjectures respecting them are so various and contradictory, that our readers will readily excuse our enlarging on them.

A little to the west of these is a stone called the Giant's thumb, six feet high, 14 inches at the base contracted to 10, which is no more than a rude cross, such as is at Langtown in Cumberland and elsewhere: the circle of the cross 3 inches diameter. M. Pouchard, in the Memoirs of the Academy of Inscriptions, gives a very curious account of some celebrated Egyptian obelisks. We cannot afford room to follow him; but those who wish for further information on the subject, and who are not possessed of the original, will find a very good account of them in the Gentleman's Magazine for June 1748.

OBELISK, means also a mark, originally of censure, now of reference, in a book, in form of a dagger (†).

OBEQUITA'TION. *s.* (from *obequito*, Lat.) The act of riding about.

OBERKIRCH, a town and castle of France, in the department of Lower Rhine, three miles from Strasburg, to whose late archbishop it belonged. Lon. 7. 50 E. Lat. 48. 35 N.

OBERNBERG, a town of Bavaria, with a castle, seated on the Inn, 15 miles S. of Passau, to whose bishop it belongs. Lon. 13. 36 E. Lat. 48. 15 N.

OBERRA'TION. *s.* (from *oberro*, Latin.) The act of wandering about.

OBE'SE. *a.* (*obesus*, Latin.) Fat; loaden with flesh.

OBE'SENESS. OBE'SITY. *s.* (from *obese.*) Morbid fatness (*Grew*).

To OBE'Y. *v. a.* (*obeir*, French.) 1. To pay submission to; to comply with (*Dryden*). 2. To yield to; to give way to.

O'BJECT. *s.* (*objet*, Fr. *objectum*, Latin.) 1. That about which any power or faculty is employed (*Hammond*). 2. Something presented to the senses to raise any affection or emotion in the mind (*Atter.*). 3. (In grammar.) Any thing influenced by somewhat else (*Clarke*).

To OBJE'CT. *v. a.* (*objecter*, Fr. *objicio, objectum*, Latin.) 1. To oppose; to present in opposition (*Bacon*). 2. To propose as a charge criminal, or a reason adverse (*Whitgift*).

OBJECT-GLASS OF A TELESCOPE, or MICROSCOPE, the glass placed at the end of the tube which is next the object.

To prove the goodness and regularity of an object-glass, on a paper describe two concentric circles, the one having its diameter the same with the breadth of the object-glass, and

the other half that diameter; divide the smaller circumference into six equal parts, pricking the points of division through with a fine needle; cover one side of the glass with this paper; and, exposing it to the sun, receive the rays through these six holes upon a plane; then by moving the plane nearer to, or further from the glass, it will be found whether the six rays unite exactly together at any distance from the glass; if they do, it is a proof of the regularity and just form of the glass; and the said distance is also the focal distance of the glass. A good way of proving the excellency of an object-glass, is by placing it in a tube, and trying it with small eye-glasses, at several distant objects; for that object-glass is always the best which represents objects the brightest and most distinct, and which bears the greatest aperture, and the most convex and concave eye-glasses, without colouring or haziness. A circular object-glass is said to be truly centered when the centre of its circumference falls exactly in the axis of the glass; and to be ill centered when it falls out of the axis. To prove whether object-glasses be well centered, hold the glass at a due distance from the eye, and observe the two reflected images of a candle, varying the distance till the two images unite, which is the true centre point: then if this fall in the middle, or central point of the glass, it is known to be truly centered. As object-glasses are commonly included in cells that screw upon the end of the tube of a telescope, it may be proved whether they be well centered by fixing the tube, proposed as an object; and observing, while the cell is unscrewed, whether the cross-hairs keep fixed upon the same lines of an object seen through the telescope.

OBJE'CTION. *s.* (*objection*, Fr. *objectio*, Lat.) 1. The act of presenting any thing in opposition. 2. Criminal charge (*Shakspeare*). 3. Adverse argument (*Burnet*). 4. Fault found (*Walsh*).

OBJE'CTIVE. *a.* (*objectif*, Fr. *objectivus*, Lat.) 1. Belonging to the object; contained in the object (*Watts*). 2. Made an object; residing in objects (*Hale*).

OBJECTIVE LINE, in perspective, is any line drawn on the geometrical plane, whose representation is sought for in a draught or picture: and the objective plane is any plane situated in the horizontal plane, the representation of which is required. See PERSPECTIVE.

OBJE'CTIVELY. *ad.* 1. In manner of an object (*Locke*). 2. In the state of an object (*Brown*).

OBJE'CTIVENESS. *s.* (from *objective*.) The state of being an object (*Hale*.)

OBJE'CTOR. *s.* (from *object*.) One who offers objections (*Blackmore*).

OBIT (Lat.) signifies a funeral solemnity, or office for the dead, most commonly performed when the corpse lies in the church uninterred. Also the anniversary office, (2 Cro. 51. Dyer 313.) The anniversary of any person's death was called the obit; and to observe such day with prayers and alms, or other commemoration, was the keeping of the obit. In religious houses they had a register, wherein they entered the obits or obitual days of their founders and benefactors; which was thence termed the obituary. The tenure of obit or chantry lands is taken away and extinct by 1 Edw. VI. c. 14. and 15. Car. II. c. 9.

To OBJU'RGATE. *v. a.* (*objurgo*, Latin.) To chide; to reprove.

OBJURGA'TION. *s.* (*objurgatio*, Latin.) Reproof; reprehension (*Bramhall*).

OBJU'RGATORY. *a.* (*objurgatorius*, Lat.) Reprehensory; culpatory; chiding.

OBLATE, flattened, or shortened, as an oblate spheroid, having its axis shorter than its middle diameter, being formed by the rotation of an ellipse about the shorter axis. The oblateness of the earth refers to the diminution of the polar axis in respect of the equatorial. The ratio of these two axes has been determined in various ways; sometimes by the measures of different degrees of latitude, and sometimes by the length of pendulums, vibrating seconds in different latitudes. See EARTH, DEGREE, &c.

OBLATI, in church-history, were secular persons, who devoted themselves and their estates to some monastery, into which they were admitted as a kind of lay-brothers. The form of their admission was putting the bell-ropes of the church round their necks, as a mark of servitude. They wore a religious habit, but different from that of the monks.

OBLA'TION. *s.* (*oblation*, French; *oblatus*, Lat.) An offering; sacrifice (*South*).

OBLECTA'TION. *s.* (*oblectatio*, Latin.) Delight; pleasure.

To O'BLIGATE. *v. a.* (*obligo*, Latin.) To bind by contract or duty.

OBLIGA'TION. *s.* (*obligatio*, Latin.) 1. The binding power of any oath, vow, duty; contract (*Glanville*.) 2. An act which binds any man to some performance (*Taylor*). 3. Favour by which one is bound to gratitude (*South*).

O'BLIGATORY. *a.* (from *obligate*.) Imposing an obligation; binding; coercive (*Tay.*)

To OBLI'GE. *v. a.* (*obliger*, Fr. *obligo*, Lat.) 1. To bind; to impose obligations; to compel to something (*Rogers*). 2. To indebt; to lay obligations of gratitude (*Dryden*). 3. To please; to gratify (*South*).

OBLIGE'E. *s.* (from *oblige*.) The person bound by a legal or written contract.

OBLI'GEMENT. *s.* (*obligement*, French.) Obligation (*Dryden*).

OBLI'GER. *s.* He who binds by contract.

OBLI'GING. *part. a.* (from *oblige*.) Civil; complaisant; respectful; engaging (*Pope*).

OBLI'GINGLY. *ad.* Civilly; complaisantly.

OBLI'GINGNESS. *s.* (from *obliging*.) 1. Obligation; force (*Decay of Piety*). 2. Civility; complaisance.

OBLIQUA'TION. *s.* (*obliquatio*, from *obliquo*, Latin.) Declination from perpendicularity; obliquity (*Newton*).

OBLI'QUE. *a.* (*oblique*, Fr. *obliquus*, Lat.) 1. Not direct; not perpendicular; not parallel

(*Bacon*). 2. Indirect; by a side glance (*Shakspeare*.). 3. (In grammar.) Any case in nouns except the nominative.

Oblique angle, one that is not a right angle, but either greater or less, being either acute or obtuse.

Oblique angled triangle, one whose angles are all oblique.

Oblique ascension, is that point of the equinoctial which rises with the centre of the sun, or star, or any other point of the heavens, in an oblique sphere.

Oblique circle, in the stereographic projection, is any circle that is oblique to the plane of projection.

Oblique descension, that point of the equinoctial which sets with the centre of the sun, or star, or other point of the heavens, in an oblique sphere.

Oblique force, or percussion, or power, or stroke, is that made in a direction oblique to a body or plane. It is demonstrated, that the effect of such oblique force, &c. upon the body, is to an equal perpendicular one, as the sine of the angle of incidence is to radius.

Oblique line, that which makes an oblique angle with some other line.

Oblique planes, in dialling, are such as recline from the zenith, or incline towards the horizon.

Oblique projection, is that where a body is projected or impelled in a line of direction that makes an oblique angle with the horizontal line.

Oblique sailing, in navigation, is that part which includes the application and calculation of oblique-angled triangles.

Oblique sphere, in geography, is that in which the axis is oblique to the horizon of a place. In this sphere the equator and parallels of declination cut the horizon obliquely. And it is this obliquity that occasions the inequality of days and nights, and the variation of the seasons. See Sphere.

Oblique leaf. (*basi cœlum, apice horizontem spectans.*) Having the base directed towards the sky, and the apex or point towards the horizon. This sense of the word oblique respects the position of a leaf; and is exemplified in protea and fritillaria. But it is also used in another sense, which respects the shape of a leaf, when the surface is placed obliquely to the petiole, as in begonia.

Oblique stem. (*a perpendicularis horizontalive linea discedens.*) Neither perpendicular nor horizontal. Respecting the general position of the stem with regard to the earth; or having a lateral direction without being bent.

OBLI'QUELY. *ad.* 1. Not directly; not perpendicularly (*Brown*). 2. Not in the immediate or direct meaning (*Addison*).

OBLI'QUENESS, Obli'quity. *s.* (*obliquité*, French, from *oblique*.) 1. Deviation from physical rectitude; deviation from parallelism or perpendicularity (*Milton*). 2. Deviation from moral rectitude (*South*).

Obliquity of the ecliptic, is the angle which the ecliptic makes with the equator. See Ecliptic.

OBLIQUUS. In anatomy, the generic name of a large tribe of muscles distributed over different parts of the body, which may be thus specifically arranged.

O. ascendens abdominis. See Obliquus internus abdominis.

O. ascendens internus. See Obliquus internus.

O. descendens abdominis. See Obliquus externus abdominis.

O. descendens externus. See Obliquus externus abdominis.

O. externus abdominis. This muscle, which is so named by Morgagni, Albinus, and Winslow, is the obliquus descendens of Vesalius and Douglas, and the obliquus major of Haller and and some others. It is a broad, thin muscle, fleshy posteriorly, and tendinous in its middle and lower parts, and is situated immediately under the integuments, covering all the other muscles of the lower belly. It arises from the lower edges of the eight, and sometimes, though rarely, of the nine inferior ribs, not far from their cartilages, by as many distinct fleshy portions, which indigitate with corresponding parts of the serratus major anticus, and the latissimus dorsi. From these several origins, the fibres of the muscle descend obliquely forwards, and soon degenerate into a broad and thin aponeurosis, which terminates in the linea alba. About an inch and a half above the pubis the fibres of this aponeurosis separate from each other, so as to form an aperture, which extends obliquely inwards and forwards, more than an inch in length, and is wider above than below, being nearly of an oval figure. This is what is sometimes, though erroneously, called the ring of the abdominal muscles, for it belongs only to the external oblique, there being no such opening either in the obliquus internus or in the transversalis, as some writers, and particularly Douglas and Cheselden, would give us to understand. This opening, or ring, serves for the passage of the spermatic vessels in men, and of the round ligament of the uterus in woman, and is of a larger size in the former than in the latter. The two tendinous portions, which, by their separation, form this aperture, are called the columns of the ring. The anterior, superior, and inner column, which is the broadest and thickest of the two, passes over the symphysis pubis, and is fixed to the opposite os pubis; so that the anterior column of the right obliquus externus intersects that of the left, and is, as it were, interwoven with it, by which means their insertion is strengthened, and their attachment made finer. The posterior, inferior, and exterior column approaches the anterior one as it descends, and is fixed behind and below it to the os pubis of the same side. The fibres of that part of the obliquus externus, which arises from the two inferior ribs, descend almost perpendicularly, and are inserted, tendinous and fleshy, into the outer edge

of the anterior half of the spine of the ilium. From the anterior superior spinous process of that bone, the external oblique is stretched tendinous to the os pubis, forming what is called Poupart's, and sometimes Fallopius's ligament, Fallopius having first described it. Winslow, and many others, named it the inguinal ligament. But, after all, it has no claim to this name, it being nothing more than the tendon of the muscle, which is turned or folded inwards at its interior edge. It passes over the blood-vessels of the lower extremity, and is thickest near the pelvis; and in women, from the greater size of the pelvis, it is longer and looser than in men. Hence we find that women are most liable to crural herniæ; whereas men, from the greater size of the ring of the external oblique, are most subject to the inguinal. From this ligament, and from that part of the tendon which forms the ring, we observe a detachment of tendinous fibres, which are lost in the fascia lata of the thigh. This may, in some measure, account for the pain which, in cases of strangulated herniæ, is felt when the patient stands upright, and which is constantly relieved upon bending the thigh upwards.* This muscle serves to draw down the ribs in expiration; to bend the trunk forwards when both muscles act, or to bend it obliquely to one side, and, perhaps, to turn it slightly upon its axis, when it acts singly; it also raises the pelvis obliquely when the ribs are fixed; it supports and compresses the abdominal viscera, assists in the evacuation of the urine and fæces, and is likewise useful in parturition.

O. inferior capitis. This muscle is larger than the obliquus superior capitis. It is very obliquely situated between the two first vertebræ of the neck. It arises tendinous and fleshy from the middle and outer side of the spinous process of the second vertebra of the neck, and is inserted, tendinous and fleshy, into the lower and posterior parts of the transverse process of the first vertebra. Its use is to turn the first vertebra upon the second, as upon a pivot, and to draw the face towards the shoulder.

O. inferior oculi. Obliquus minor oculi of Winslow. An oblique muscle of the eye, that draws the globe of the eye forwards, inwards, and downwards. It arises by a narrow beginning from the outer edge of the orbitar process of the superior maxillary bone, near its junction with the lachrymal bone, and running obliquely outwards, is inserted into the sclerotic membrane of the eye.

O. internus abdominis. This muscle, which is the obliquus ascendens of Vesalius and Douglas, and the obliquus minor of Haller, is situated immediately under the external oblique, and is broad and thin like that muscle, but somewhat less considerable in its extent. It arises from the spinous processes of the three inferior lumbar vertebræ, and from the posterior and middle part of the os sacrum, by a thin tendinous expansion, which is common to it and to the serratus posticus inferior; by short tendinous fibres, from the whole spine of the ilium, between its posterior tuberosity and its anterior and superior spinous process; and from two-thirds of the posterior surface of what is called Fallopius's ligament, at the middle of which we find the round ligament of the uterus in women, and the spermatic vessels in men, passing under the thin edge of this muscle; and in the latter it likewise sends off some fibres, which descend upon the spermatic chord, as far as the tunica vaginalis of the testis, and constitute what is called the cremaster muscle, which surrounds, suspends, and compresses the testicle. From these origins, the fibres of the internal oblique run in different directions; those of the posterior portion ascend obliquely forwards, the middle ones become less and less oblique, and, at length, run in an horizontal direction, and those of the anterior portion extend obliquely downwards. The first of these are inserted, by very short tendinous fibres, into the cartilages of the fifth, fourth, and third of the false ribs; the fibres of the second, or middle portion, form a broad tendon, which, after being inserted into the lower edge of the cartilage of the second false rib, extends towards the linea alba, and separates into two layers; the anterior layer, which is the thickest of the two, joins the tendon of the obliquus externus, and runs over the two upper thirds of the rectus muscle, to be inserted into the linea alba; the posterior layer runs under the rectus, adheres to the anterior surface of the tendon of the transversalis, and is inserted into the cartilages of the first of the false, and the last of the true ribs, and likewise into the linea alba. By this structure we may perceive that the greater part of the rectus is inclosed, as it were, in a sheath. The fibres of the anterior portion of the internal oblique, or those which arise from the spine of the ilium and the ligamentum Fallopii, likewise form a broad tendon, which, instead of separating into two layers like that of the other part of the muscle, runs over the lower part of the rectus, and adhering to the under surface of the tendon of the external oblique is inserted into the fore part of the pubis. This muscle serves to assist the obliquus externus; but it seems to be more evidently calculated than that muscle is to draw the ribs downwards and backwards. It likewise serves to separate the false ribs from the true ribs, and from each other.

O. major abdominis. See OBLIQUUS EXTERNUS ABDOMINIS.

O. major capitis. See OBLIQUUS INFERIOR CAPITIS.

O. major oculi. See OBLIQUUS SUPERIOR OCULI.

O. minor abdominis. See OBLIQUUS INTERNUS ABDOMINIS.

O. minor capitis. See OBLIQUUS SUPERIOR CAPITIS.

O. minor oculi. See OBLIQUUS INFERIOR OCULI.

O. superior capitis. Riolanus, who was the first that gave particular names to the oblique muscles of the head, called this muscle, obliquus minor, to distinguish it from the inferior,

which, on account of its being much larger, he named obliquus major. Spigelius afterwards distinguished the two, from their situation with respect to each other, into superior and inferior; and in this he is followed by Cowper and Douglas. Winslow retains both names. That used by Albinus is here adopted. This little muscle, which is nearly of the same shape as the recti capitis, is situated laterally between the occiput and the first vertebra of the neck, and is covered by the complexus and the upper part of the splenius. It arises, by a short thick tendon, from the upper and posterior part of the transverse process of the first vertebra of the neck, and ascending obliquely inwards and backwards, becomes broader, and is inserted, by a broad flat tendon and some few fleshy fibres, into the os occipitis, behind the back part of the mastoid process, under the insertion of the complexus and splenius, and a little above that of the rectus major. The use of this muscle is to draw the head backwards, and perhaps to assist in its rotatory motion.

O. superior oculi. Trochlearis. Obliquus major of Winslow. An oblique muscle of the eye, that rolls the globe of the eye, and turns the pupil downwards and outwards. It arises like the straight muscles of the eye from the foramen opticum at the bottom of the orbit, between the rectus superior and rectus internus, from thence runs straight along the papyraceous portion of the ethmoid bone to the upper part of the orbit, where a cartilaginous trochlea is fixed to the inside of the internal angular process of the os frontis, through which its tendon passes, and runs a little downwards and outwards, inclosed in a loose membranaceous sheath, to be inserted into the sclerotic membrane. For the comparative powers and value of these muscles, see ANATOMY.

To OBLI'TERATE. *v. a.* (*oblitero*, Lat.) 1. To efface any thing written. 2. To wear out; to destroy; to efface (*Hale*).

OBLITERA'TION. *s.* (*obliteratio*, Latin.) Effacement; extinction (*Hale*).

OBLI'VION. *s.* (*oblivio*, Latin.) 1. Forgetfulness; cessation of remembrance. 2. Amnesty; general pardon of crimes in a state (*Davies*).

OBLI'VIOUS. *a.* (*obliviosus*, Lat.) Causing forgetfulness (*Philips*).

OBLO'NG. *a.* (*oblong*, Fr. *oblongus*, Lat.) Longer than broad (*Harris*).

OBLONG SPHEROID, is that which is formed by an ellipse revolved about its longer or transverse axis; in contradistinction from the oblate spheroid, or that which is flatted at its poles, being generated by the revolution of the ellipse about its conjugate or shorter axis.

OBLONG LEAF. In botany. Cujus diameter longitudinalis aliquoties superat transversalem, et utraque extremitas segmento circuli angustior.—Having its longitudinal diameter several times exceeding the transverse one; rounded at both ends, but the curvature of each less than the segment of a circle. Applied also to the spike and capsule.

OBLO'NGLY, *ad.* (from *oblong.*) In an oblong form (*Cheyne*).

OBLO'NGNESS. *s.* (from *oblong.*) The state of being oblong.

OBLONGO-OVATE LEAF. An oblong-ovate leaf. Between both, but inclining most to the latter.

O'BLOQUY. *s.* (*obloquor*, Latin.) 1. Censorious speech; blame; slander (*Daniel*). 2. Cause of reproach; disgrace (*Shakspeare*).

OBMUTE'SCENCE. *s.* (from *obmutesco*, Lat.) Loss of speech (*Brown*).

OBNO'XIOUS. *a.* (*obnoxius*, Latin.) 1. Subject (*Bacon.*) 2. Liable to punishment (*Calamy*). 3. Reprehensible (*Fell*). 4. Liable; exposed (*Hayward*).

OBNO'XIOUSLY. *ad.* In a state of subjection; in the state of one liable to punishment.

OBNO'XIOUSNESS. *s.* (from *obnoxious.*) Subjection; liableness to punishment

To OBNU'BILATE. *v. a.* (*obnubilo*, Lat.) To cloud; to obscure.

OBOLARIA, in botany, a genus of the class didynamia, order angiospermia. Calyx two-cleft; corol four-cleft, campanulate; capsule one-celled, two-valved, many-seeded; stamens from the divisions of the corol. One species, a Virginian herb, with flowers in terminal spikes, clustered at top, pale red.

OBOLUS, an ancient silver money of Athens, the sixth part of a drachma; worth somewhat more than a penny-farthing sterling. The word comes from the Greek ὀβολος, or ὀβελος, spit, or broach; either because it bore such an impression; or because, according to Eustathius, it was in form thereof. But those now in the cabinets of the antiquaries are round.

OBOLUS, in medicine, is used for a weight of ten grains, or half a scruple.

OBOVATE LEAF. An inversely ovate leaf. Having the narrow end downwards; or next the petiole, branch, or stem.

OBRECHT (Ulric), a learned German, born 1646, at Strasburg. After finishing his travels, he settled at Strasburg, where he married the daughter of Boecler, whom he succeeded in the chairs of eloquence and history. On the conquest of Strasburg by Louis XIV, Obrecht changed his religion from protestant to Roman catholic, and was in consequence made, in 1685, president of the senate of his native town, with the title of prætor royal. He died of a fever 1701. He wrote Prodromus rerum Alsaticarum, 4to; Excerpta Historica, de Naturâ Successionis in Monarch. Hispan. 3 vols. 4to.; Quintilian, with notes, 2 vols. 4to; the Life of Pythagoras, from Iamblicus; de Vexillo Imperii; Dictys Cretensis, &c.

OBREPTION. *s.* (*obreptio*, Lat.) The act of creeping on with secrecy or by surprise.

To O'BROGATE. *v. a.* (*obrogo*, Latin.) To proclaim a contrary law for the dissolution of the former.

OBSCE'NE. *a.* (*obscene*, French.) 1. Immodest; not agreeable to chastity of mind;

causing lewd ideas (*Milton*). 2. Offensive; disgusting (*Dryden*). 3. Inauspicious; ill-omened (*Dryden*).

OBSCE'NELY. *ad.* In an impure and unchaste mann r.

OBSCE'NENESS. OBSCE'NITY. *s.* (*obscenite* F ench; from *obscene*.) Impurity of thoug or l nguage; unchastity; lewdness (*Dryden*).

OB' URA'TION. *s.* (*obscuratio*, Latin.) 1. The act of darkening. 2. A state of being darkened (*Burnet*).

OBSCU'RE. *a.* (*obscurus*, Latin.) 1. Dark; unenlightened; gloomy; hindering sight (*Milton*). 2. Living in the dark (*Shakspeare*). 3. Not easily intelligible; abstruse; difficult (*Dryden*). 4. Not noted; not observable (*Atterbury*).

To OBSCU'RE. *v. a.* (*obscuro*, Latin.) 1. To darken; to make dark (*Pope*). 2. To make less visible (*Brown*). 3. To make less intelligible (*Holder*). 4. To make less glorious, beautiful, or illustrious (*Dryden*). 5. To conceal; to make unknown (*Milton*).

OBSCU'RELY. *ad.* (from *obscure*.) 1. Not brightly; not luminously; darkly. 2. Out of sight; privately; without notice; not conspicuously (*Addison*). 3. Not clearly; not plainly (*Milton*).

OBSCU'RENESS. OBSCU'RITY. *s.* (*obscuritas*, Latin.) 1. Darkness; want of light (*Donne*). 2. Unnoticed state; privacy (*Dryden*). 3. Darkness of meaning (*Locke*).

OBSECRA'TION. *s.* (*obsecratio*, Latin.) Intreaty; supplication (*Stillingfleet*).

O'BSEQUIES. *s.* (*obseques*, French.) 1. Funeral rites; funeral solemnities (*Sidney*). 2. It is found in the singular perhaps more properly (*Milton*).

OBSE'QUIOUS. *a.* (from *obsequium*, Lat.) 1. Obedient; compliant; not resisting (*Add.*) 2. In *Shakspeare*, funeral.

OBSE'QUIOUSLY. *ad.* (from *obsequious*.) 1. Obediently; with compliance (*Dryden*). 2. In *Shakspeare*, with funeral rites.

OBSE'QUIOUSNESS. *s.* (from *obsequious*.) Obedience; compliance (*South*).

OBSE'RVABLE. *a.* (from *observe*, Latin.) Remarkable; eminent (*Rogers*).

OBSE'RVABLY. *ad.* (from *observable*.) In a manner worthy of note (*Brown*).

OBSE'RVANCE. *s.* (*observance*, French.) 1. Respect; ceremonial reverence (*Dryden*). 2. Religious rite (*Rogers*). 3. Attentive practice (*Rogers*). 4. Rule of practice (*Shakspeare*). 5. Careful obedience (*Rogers*). 6. Observation; attention (*Hale*). 7. Obedient regard (*Wotton*).

OBSE'RVANT. *a.* (*observans*, Latin.) 1. Attentive; diligent; watchful (*Raleigh*). 2. Obedient; respectful (*Digby*). 3. Respectfully attentive (*Pope*). 4. Meanly dutiful; submissive (*Raleigh*).

OBSE'RVANT. *s.* A slavish attendant: not in use (*Shakspeare*).

OBSERVA'TION. *s.* (*observatio*, Latin.) 1. The act of observing, noting, or remarking (*Rogers*). 2. Notion gained by observing; note; remark; animadversion (*Watts*). 3. Obedience; ritual practice (*White*).

OBSERVATION, in astronomy and navigation, is the observing with an instrument some celestial phenomenon; as, the altitude of the sun, moon, or stars, or their distances asunder, &c. But by this term the seamen commonly mean only the taking the meridian altitudes, in order to find the latitude. And the finding the latitude from such observed altitude, they call working an observation.

OBSERVA'TOR. *s.* (*observateur*, French.) One that observes; a remarker (*Dryden*).

OBSERVATORY, a place destined for observing the heavenly bodies; or a building, usually in form of a tower, erected on some eminence, and covered with a terrace for making astronomical observations.

Most nations, at almost all times, have had their observatories, either public or private ones, and in various degrees of perfection. A description of a great any of them may be seen in a dissertation of Weidler's, De præsenti Specularum Astronomicarum Statu, printed in 1727, and in different articles of his History of Astronomy, printed in 1741, viz. page 86, &c.; as also in Lalande's Astronomy, the preface page 34. The chief among these are the following:

1. The Greenwich observatory, or royal observatory of England. This was built and endowed in the year 1676, by order of king Charles II. at the instance of sir Jonas Moore, and sir Christopher Wren: the former of these gentlemen being surveyor-general of the ordnance, the office of astronomer royal was placed under that department, in which it has continued ever since.

This observatory was at first furnished with several very accurate instruments; particularly a noble sextant of 7 feet radius, with telescopic sights. And the first astronomer royal, or the person to whom the province of observing was first committed, was Mr. John Flamsteed; a man who, as Dr. Halley expresses it, seemed born for the employment. During 14 years he watched the motions of the planets with unwearied diligence, especially those of the moon, as was given him in charge; that a new theory of that planet being found, shewing all her irregularities, the longitude might thence be determined.

In the year 1690, having provided himself with a mural arch of near 7 feet radius, made by his assistant Mr. Abraham Sharp, and fixed in the [illegible] of the meridian, he began to ve[illegible] [illegible]logue of the fixed stars, which had [illegible] pended altogether on the distances [illegible]red with the sextant, after a new and [illegible] manner, viz. by taking the meri[illegible] [illegible]udes, and the moments of culmination, or in other words the right ascension and declination. And he was so well pleased with this instrument, that he discontinued almost entirely the use of the sextant.

Thus, in the space of upwards of 40 years,

the astronomer royal collected an immense number of good observations; which may be found in his Historia Cœlestis Britannica, published in 1725; the principal part of which is the Britannic catalogue of the fixed stars.

Mr. Flamsteed, on his death in 1719, was succeeded by Dr. Halley, and he by Dr. Bradley in 1742, and this last by Mr. Bliss in 1762; but none of the observations of these gentlemen have yet been given to the public.

On the demise of Mr. Bliss, in 1765, he was succeeded by Dr. Nevil Maskelyne, the late worthy astronomer royal, whose valuable observations have been published, from time to time, under the direction of the Royal Society, in several folio volumes. Of these observations Lalande speaks thus in his Astronomy (vol. ii. page 121), "Le recueil le plus moderne et le plus précieux de tous est celui de M. Maskelyne, Astronome Royal d'Angleterre, qui commence à 1765, et qui forme déja deux volumes en folio jusqu'à 1786. La précision de ces observations est si grande, qu'on trouve souvent la même seconde pour l'ascension droite d'une planete déduite de différentes étoiles, quoiqu'on y emploie la mesure du temps." His catalogue of fundamental stars is an invaluable treasure. These and his other numerous and various improvements in this science, made during the 46 years he was astronomer royal, entitled him to the most distinguished rank among both the critical and practical astronomers, and will render his name illustrious so long as astronomy shall continue to be cultivated.

This excellent astronomer and truly amiable man died in the spring of 1811, and was succeeded by Mr. J. Pond, F.R.S. known to the public as the translator of Laplace's Exposition du Systême du Monde: to whom our best wish is, that he may fill the situation in which he has recently been placed as long, as honourably, and as beneficially to astronomy and navigation, as his truly scientific predecessor.

The Greenwich observatory is found, by very accurate observations, to lie in 51° 28′ 40″ north latitude, as settled by Dr. Maskelyne, from many of his own observations, as well as those of Dr. Bradley.

II. The Paris observatory was built by Louis XIV. in the fauxbourg St. Jaques, being begun in 1664, and finished in 1672. It is a singular but magnificent building, of 80 feet in height, with a terrace at top; and here M. De la Hire, M. Cassini, &c. the king's astronomers, have made their observations. Its latitude is 48° 50′ 14″ north, and its longitude 9′ 20″ east of Greenwich observatory.

In the observatory of Paris is a cave, or pit, 170 feet deep, with subterraneous passages, for experiments that are to be made out of the reach of the sun, especially such as relate to congelations, refrigerations, &c. In this cave there is an old thermometer of M. De la Hire, which stands always at the same height; thereby shewing that the temperature of the place remains always the same. From the top of the platform to the bottom of the cave is a perpendicular well or pit, used formerly for experiments on the fall of bodies; being also a kind of long telescopical tube, through which the stars are seen at midday.

III. Tycho Brahe's observatory was in the little island Ween, or the Scarlet Island, between the coasts of Schonen and Zealand, in the Baltic sea. This observatory was not well situated for some kinds of observations, particularly the risings and settings; as it lay too low, and was landlocked on all the points of the compass except three; and the land horizon being very rugged and uneven.

IV. Pekin observatory. Father Le Compte describes a very magnificent observatory, erected and furnished by the late emperor of China, in his capital, at the intercession of some jesuit missionaries, chiefly father Verbiest, whom he appointed his chief observer. The instruments here are exceeding large; but the divisions are less accurate, and, in some respects, the contrivance is less commodious than in those of the Europeans. The chief are, an armillary zodiacal sphere, of 6 Paris feet diameter, an azimuthal horizon 6 feet diameter, a large quadrant 6 feet radius, a sextant 8 feet radius, and a celestial globe 6 feet diameter.

V. Bramin's observatory at Benares, in the East Indies, which is still one of the principal seminaries of the Bramins or priests of the original Gentoos of Hindustan. This observatory at Benares it is said was built about 200 years since, by order of the emperor Ackbar: for as this wise prince endeavoured to improve the arts, so he wished also to recover the sciences of Hindustan, and therefore ordered that three such places should be erected; one at Delhi, another at Agra, and the third at Benares.

Wanting the use of optical glasses to magnify very distant or very small objects, these people directed their attention to the increasing the size of their instruments, for obtaining the greater accuracy and number of the divisions and subdivisions in their instruments. Accordingly, the observatory contains several huge instruments of stone, very nicely erected and divided, consisting of circles, columns, gnomons, dials, quadrants, &c. some of them of 20 feet radius, the circle divided first into 360 equal parts, and sometimes each of these into 20 other equal parts, each answering to 3′, and of about two-tenths of an inch in extent. And although these wonderful instruments have been built upwards of 200 years, the graduations and divisions on the several arcs appear as well cut, and as accurately divided, as if they had been the performance of a modern artist. The execution in the construction of these instruments exhibits an extraordinary mathematical exactness in the fixing, bearing, fitting of the several parts, in the necessary and sufficient supports to the very large stones that compose them, and in the joining and fastening them into each other by means of lead and iron.

See a farther description and drawing of this observatory, by sir Robert Barker, in the

Philos. Trans. vol. lxvii. page 598. or New Abridgment, vol. xvi. page 217. and vol. xvii. page 291. There are also good observatories at Lilienthal, at Dublin, and Oxford; and valuable private observatories at Blenheim; in Dr. Herschel's garden at Slough, and at Mr. Groombridge's, of Blackheath.

OBSERVATORY (Portable). See EQUATOREAL.

To OBSE'RVE. *v. a.* (*observo*, Latin.) 1. To watch; to regard attentively (*Taylor*). 2. To find by attention; to note (*Locke*). 3. To regard or keep religiously (*Exodus*). 4. To practise ritually (*White*). 5. To obey; to follow.

To OBSERVE. *v. n.* 1. To be attentive (*Watts*). 2. To make a remark (*Pope*).

OBSE'RVER. *s.* (from *observe.*) 1. One who looks vigilantly on persons and things; close remarker (*Swift*). 2. One who looks on; the beholder (*South*). 3. One who keeps any law, or custom, or practice (*Bacon*).

OBSE'RVINGLY. *ad.* (from *observing.*) Attentively; carefully (*Shakspeare*).

OBSE'SSION. *s.* (*obsessio*, Latin.) 1. The act of besieging. 2. The first attack of Satan, antecedent to possession.

OBSIDIAN. Iceland agate. In mineralogy, a genus of the class earths, order siliceous. Colour pure black, passing into greenish and greyish black, blackish, blueish and greenish grey, and smoke-grey: found in mass, and in rough, roundish detached pieces; internally more or less shining and vitreous; fracture perfect, and large conchoidal; fragments indeterminately angular and sharp-edged; hard, but easily frangible; before the blow-pipe melts without addition into a greyish-white, opake, somewhat porous enamel: specific gravity 2, 34: contains

Silica	-	69
Alumina	-	22
Oxyd of iron	-	9
		100 *Bergman.*

Found in large beds in the Lipari islands near Sicily, where it evidently passes into pumice; near Tokay in Hungary, in smoke-coloured nodules in decomposing granite and porphyry—nodules sometimes called *lux sapphire*; found also near Hecla and in other parts of Iceland; in the island Melos in the Archipelago; near Grantola in the north of Italy; in Madagascar, Peru, and Siberia. Its origin is warmly contested between the Neptunians and Plutonians, many of the latter denominating it a vitreous lava.

From its hardness and opake blackness, and especially from the high polish of which it is capable, it is employed in various kinds of ornaments. The Spaniards, when they first conquered Peru, found it applied in that country to the purpose of mirrors; and it has since been fashioned in Europe into reflectors for telescopes.

OBSI'DIONAL. *a.* (*obsidionalis*, Lat.) Belonging to a siege.

O'BSOLETE. *a.* (*obsoletus*, Latin.) Worn out of use; disused; unfashionable (*Swift*).

OBSOLE'TENESS. *s.* (from *obsolete.*) State of being worn out of use; unfashionableness.

O'BSTACLE. *s.* (*obstacle*, French.) Something opposed; hinderance; obstruction (*Collier*).

OBSTETRICA'TION. *s.* (from *obstetricor*, Latin.) The office of midwife.

OBSTE'TRIC. *a.* from (*obstetrix*, Latin.) Midwifish; befitting a midwife; doing the midwife's office (*Pope*).

OBSTETRIC. (*obstetricus*, from *obstetrix*, a nurse.) Belonging to midwifery.

OBSTETRICS. The doctrines or practice of midwifery. The term, however, is employed in a larger signification than midwifery in its usual sense, which last is confined to the human female alone, while the former is often extended to the female of other animals, and especially of the mammal class. On this branch of obstetrics, the best directions with which we are acquainted are those given by Mr. Lawrence and Mr. Downing

O'BSTINACY. *s.* (*obstinatio*, Lat.) Stubbornness; contumacy; pertinacy; persistency (*Locke*).

O'BSTINATE. *a.* (*obstinatus*, Lat.) Stubborn; contumacious; fixed in resolution (*Shakspeare*).

O'BSTINATELY. *ad.* (from *obstinate.*) Stubbornly; inflexibly (*Clarendon*).

O'BSTINATENESS. *s.* (from *obstinate.*) Stubbornness.

OBSTIPATION. (*obstipatio*, from *obstipo*, to stop up.) Costiveness. A genus of disease in the class locales, and order epischeses of Cullen, comprehending three species: 1. Obstipatio debilium, in weak and commonly dyspeptic persons. 2. Obstipatio rigidorum, in persons of rigid fibres and a melancholy temperament. 3. Obstipatio obstructorum, from obstructions. See COLICA.

OBSTRE'PEROUS. *a.* (*obstreperus*, Lat.) Loud; clamorous; noisy; turbulent (*Dryd.*).

OBSTRE'PEROUSLY. *ad.* (from *obstreperous.*) Loudly; clamorously; noisily.

OBSTRE'PEROUSNESS. *s.* (from *obstreperous.*) Loudness; clamour; noise.

OBSTRI'CTION. *s.* (from *obstrictus*, Lat.) Obligation; bond (*Milton*).

To OBSTRU'CT. *v. a.* (*obstruo*, Latin.) 1. To block up; to bar (*Arbuthnot*). 2. To oppose; to retard; to hinder; to be in the way of (*Milton*).

OBSTRU'CTER. *s.* (from *obstruct.*) One that hinders or opposes.

OBSTRUC'TION. *s.* (*obstructio*, Latin.) 1. Hinderance; difficulty (*Denham*). 2. Obstacle; impediment (*Clarendon*). 3. (In physic.) The blocking up of any canal in the body, so as to prevent the flowing of any fluid through it (*Quincy*). 4. In *Shakspeare* it once signifies something heaped together.

OBSTRU'CTIVE. *a.* (*obstructif*, French.) Hindering; causing impediment (*Hammond*).

OBSTRU'CTIVE. *s.* Impediment; obstacle (*Hammond*).

O'BSTRUENT. *a.* (*obstruens*, Lat.) Hindering; blocking up.

OBSTUPEFA'CTION. *s.* (*obstupefacio*, Latin.) The act of inducing stupidity, or interruption of the mental powers.

OBSTUPEFA'CTIVE. *a.* (from *obstupefacio*, Lat.) Obstructing the mental powers (*Abbot*).

To OBTAI'N. *v. a.* (*obtineo*, Latin.) 1. To gain; to acquire; to procure (*Arbuth.*). 2. To impetrate; to gain by the concession or excited kindness of another (*Hooker*).

To OBTAI'N. *v. n.* 1. To continue in use (*Baker*). 2. To be established; to subsist in nature or practice (*Dryden*). 3. To prevail; to succeed: not used (*Bacon*).

OBTA'INABLE. *a.* (from *obtain.*) 1. To be procured (*Arbuthnot*). 2. To be gained (*Kettlewell*).

OBTA'INER. *s.* He who obtains.

To OBTE'MPERATE. *v. a.* (*obtemperer*, Fr. *obtempero*, Latin.) To obey.

To OBTE'ND. *v. a.* (*obtendo*, Latin.) 1. To oppose; to hold out in opposition. 2. To pretend; to offer as the reason of any thing (*Dryden*).

OBTENEBRA'TION. *s.* (*ob* and *tenebræ*, Lat.) Darkness; the state of being darkened; the act of darkening; cloudiness (*Bacon*).

OBTE'NTION. *s.* (from *obtend.*) The act of obtending.

To OBTE'ST. *v. a.* (*obtestor*, Latin.) To beseech; to supplicate (*Dryden*).

OBTESTA'TION. *s.* (*obtestatio*, Latin; from *obtest.*) Supplication; entreaty.

OBTRECTA'TION. *s.* (*obtrecto*, Latin.) Slander; detraction; calumny.

To OBTRU'DE. *v. a.* (*obtrudo*, Lat.) To thrust into any place or state by force or imposture; to offer with unreasonable importunity (*Hall*).

OBTRU'DER. *s.* One that obtrudes (*Boyle*).

OBTRU'SION. *s.* (from *obtrusus*, Lat.) The act of obtruding (*King Charles*).

OBTRU'SIVE. *a.* (from *obtrude.*) Inclined to force one's self, or any thing else, upon others (*Milton*).

To OBTU'ND. *v. a.* (*obtundo*, Latin.) To blunt; to dull; to quell; to deaden (*Harv.*).

OBTURA'TION. *s.* (from *obturatus*, Lat.) The act of stopping up any thing with something smeared over it.

OBTURATOR EXTERNUS. In myology. This is a small flat muscle, situated obliquely at the upper and anterior part of the thigh, between the pectinalis and the fore part of the foramen thyroideum, and covered by the adductor brevis femoris. It arises tendinous and fleshy from all the inner half of the circumference of the foramen thyroideum, and likewise from part of the obturator ligament. Its radiated fibres collect and form a strong roundish tendon, which runs outwards, and after adhering to the capsular ligament of the joint, is inserted into a cavity at the inner and back part of the root of the great trochanter. The chief uses of this muscle are to turn the thigh obliquely outwards, to assist in bending the thigh, and in drawing it inwards. It likewise prevents the capsular ligament from being pinched in the motions of the joint.

OBTURATOR INTERNUS. Marsupialis, seu obturator internus of Douglas. This is a considerable muscle, a great part of which is situated within the pelvis. It arises, by very short tendinous fibres, from somewhat more than the upper half of the internal circumference of the foramen thyroideum of the os innominatum. It is composed of several distinct fasciculi, which terminate in a roundish tendon that passes out of the pelvis, through the niche that is between the spine and the tuberosity of the ischium, and, after running between the two portions of the gemini in the manner just now described, is inserted into the cavity at the root of the great trochanter, after adhering to the adjacent part of the capsular ligament of the joint. This muscle rolls the os femoris obliquely outwards, by pulling it towards the ischiatic niche, upon the cartilaginous surface of which its tendon, which is surrounded by a membranous sheath, moves as upon a pulley.

OBTURATOR NERVE. A nerve of the thigh, that is lost upon its inner muscles.

OBTUSA'NGULAR. *a.* (from *obtuse* and *angle.*) Having angles larger than right angles.

OBTU'SE. *a.* (*obtusus*, Latin.) 1. Not pointed; not acute. 2. Not quick; dull; stupid (*Milton*). 3. Not shrill; obscure: as, an *obtuse* sound.

OSTU'SELY. *ad.* 1. Without a point. 2. Dully; stupidly.

OBTU'SENESS. *s.* Bluntness; dullness.

OBTU'SION. *s.* (from *obtuse.*) 1. The act of dulling. 2. The state of being dulled.

OBVE'NTION. *s.* (*obvenio*, Lat.) Something happening not constantly and regularly, but uncertainly (*Spenser*).

OBVERSE. In botany. Cujus basis angustior, ita ut basis concipiatur ubi nunc apex. Philos. Bot. p. 220.—Having the base narrower than the top, so that they seem to have changed places. See OBCORDATE and OBOVATE.

To OBVE'RT. *v. a.* (*obverto*, Latin.) to turn toward (*Boyle*).

To O'BVIATE. *v. a.* (from *obvius*, Latin; *obvier*, French.) To meet in the way; to prevent by interception (*Woodward*).

O'BVIOUS. *a.* (*obvius*, Latin.) 1. Meeting any thing; opposed in front to any thing (*Milton*). 2. Open; exposed (*Milton*). 3. Easily discovered; plain; evident (*Dryden*).

O'BVIOUSLY. *ad.* 1. Evidently; apparently (*Locke*). 2. Easily to be found (*Selden*). 3. Naturally (*Holyday*).

O'BVIOUSNESS. *s.* (from *obvious.*) State of being evident or apparent (*Boyle*).

OBVOLUTE. In botany, applied to foliation, vernation, or leaves. Quum margines alterni comprehendunt oppositi folii marginem

rectum. When (as the leaves lie in the bud) the margins alternately embrace the straight margin of the opposite leaf.

To OBU'MBRATE. *v. a.* (*obumbro*, Lat.) To shade; to cloud (*Howel*).

OBUMBRATION. *s.* (from *obumbro*, Lat.) The act of darkening or clouding.

OBY, or OB, a large and famous river of Asiatic Russia, which issues from the Altin lake (called by the Russians Teleskoi-Osero), in latitude 52 degrees, and longitude 103 degrees 30 minutes. Its name signifies great; and accordingly in Russia it is often styled the Great River. The Calmucks and Tartars call it Umar. Its stream is very large and smooth, its current being usually slow; and it is in general between two and three hundred fathoms broad; though in some places it is much wider. It affords plenty of fish, and is navigable almost to the lake from which it springs. After a long winding course through a vast tract of land, in which it forms several islands, it empties itself in latitude 67 degrees, and longitude 86 degrees, into a bay, which, extending near 400 miles farther, joins the Ice Sea in latitude 73. 30 N. and lodgitude 90. E.

OCCAM or OCCHAM (William), a divine of the fourteenth century; the disciple of Duns Scotus, so renowned as to acquire the name of the invincible doctor. As a cordelier, he was engaged by de Cesena, the general of his order, to attack the church of Rome, and pope John XXII. and in consequence of this dispute, which gave rise to the question about the bread of the cordeliers, both Occam and his friend were excommunicated by the pontiff. Occam died 1374. His works in 2 vols. display both wit and subtility.

OCCA'SION. *s.* (*occasio*, Latin.) 1. Occurrence; casualty; incident (*Hooker*). 2. Opportunity; convenience (*Genesis*). 3. Accidental cause (*Spenser*). 4. Reason not cogent, but opportune (*Shakspeare*). 5. Incidental need; casual exigence (*Baker*).

To OCCA'SION. *v. a.* (from the noun). 1. To cause casually (*Atterbury*). 2. To cause; to produce (*Temple*). 3. To influence (*Locke*).

OCCA'SIONAL. *a.* (from *occasion.*) 1. Incidental; casual (*Burnet*). 2. Producing by accident (*Brown*). 3. Producing by occasion or incidental exigence (*Dryden*).

OCCA'SIONALLY. *ad.* According to incidental exigence; incidentally (*Woodward*).

OCCA'SIONER. *s.* One that causes, or promotes by design or accident (*Sanderson*).

OCCECA'TION. *s.* (*occæcatio*, Lat.) The act of blinding or making blind (*Sanderson*).

OCCIDENT, in geography, the westward quarter of the horizon, or that part of the horizon where the ecliptic, or the sun's place in it, descends into the lower hemisphere.

OCCIDENT (Equinoctial), that point of the horizon where the sun sets, when he crosses the equinoctial, or enters the sign Aries or Libra.

OCCIDENT (Estival), that point of the horizon where the sun sets at his entrance into the sign Cancer, or in our summer when the days are longest.

OCCIDENT (Hybernal), that point of the horizon where the sun sets at midwinter, when entering the sign Capricorn.

OCCIDE'NTAL. *a.* (*occidentalis*, Lat.) Western (*Howel*).

OCCI'DUOUS. *a.* (*occidens*, Lat.) Western.

OCCI'PITAL. *a.* (*occipitalis*, Lat.) Placed in the hinder part of the head.

OCCIPITAL BONE. Os basilare. In anatomy. This bone, which forms the posterior and inferior part of the scull, is of an irregular figure, convex on the outside, and concave internally. Its external surface, which is very irregular, serves for the attachment of several muscles. It affords several inequalities, which sometimes form two semicircular hollows separated by a scabrous ridge. The inferior portion of the bone is stretched forwards in form of a wedge, and hence is called the cuneiform process. At the base of this process, situated obliquely on each side of the foramen magnum, are two flat, oblong protuberances, named condyles. They are covered with cartilage, and serve for the articulation of the head with the first vertebra of the neck. In the inferior portion of this bone, at the basis of the cranium, and immediately behind the cuneiform process, we observe a considerable hole, through which the medulla oblongata passes into the spine. The nervi accessorii, the vertebral arteries, and sometimes the vertebral veins likewise pass through it. Man being designed for an erect posture, this foramen magnum is found nearly in the middle of the basis of the human cranium, and at a pretty equal distance from the posterior part of the occiput, and the anterior part of the lower jaw; whereas in quadrupeds it is nearer the back part of the occiput. Besides this hole, there are four other smaller foramina, viz. two before, and two behind the condyles. The former serve for the transmission of the ninth pair of nerves, and the two latter for the veins which pass from the external parts of the head to the lateral sinuses. On looking over the internal surface of the os occipitis we perceive the appearance of a cross, formed by a very prominent ridge, which rises upwards from near the foramen magnum, and by two transverse sinuosities, one on each side of the ridge. This cross occasions the formation of four fossæ, two above and two below the sinuosities. In the latter are placed the lobes of the cerebellum, and in the former the posterior lobes of the brain. The two sinuosities serve to receive the lateral sinuses. In the upper part of this bone is seen a continuation of the sinuosity of the longitudinal sinus; and at the basis of the cranium we observe the inner surface of the cuneiform process made concave for the reception of the medulla oblongata. The occipital bone is thicker and stronger than any of the other bones of the head, except the petrous part of the ossa temporum; but it is of unequal thickness. At its lateral and inferior parts, where it is thinnest, it is covered by a great number of muscles. The reason for so much thickess and strength in this bone seems to be, that it covers the cerebellum,

in which the least wound is of the utmost consequence; and that it is, by its situation, more liable to be fractured by falls than any other bone of the cranium. For, if we fall forwards, the hands are naturally put out to prevent the forehead's touching the ground; and if on one side, the shoulders in a great measure protect the sides of the head; but if a person fall backwards, the hind part of the head consequently strikes against the earth, and that too with considerable violence. Nature therefore has wisely constructed this bone so as to be capable of the greatest strength at its upper part, where it is the most exposed to injury. The os occipitis is joined, by means of the cuneiform process, to the sphenoid bone, with which it often ossifies, and makes but one bone in those who are advanced in life. It is connected to the parietal bones by the lambdoidal suture, and to the temporal bones by the additamentum of the temporal suture. The head is likewise united to the trunk by means of this bone. The two condyles of the occipital bone are received into the superior oblique processes of the atlas, or first vertebra of the neck, and it is by means of this articulation that a certain degree of motion of the head backwards and forwards is performed. But it allows only very little motion to either side; and still less of a circular motion, which the head obtains principally by the circumvolution of the atlas on the second vertebra, as is described more particularly in the account of the vertebræ. In the fœtus, the os occipitis is divided by an unossified cartilaginous substance into four parts. One of these, which is the largest, constitutes all that portion of the bone that is above the foramen magnum; two others, which are much smaller, compose the sides of the foramen magnum, and include the condyloid processes; and the fourth is the cuneiform process. This last is sometimes not completely united with the rest so as to form one bone before the sixth or seventh year.

OCCIPITALIS. In anatomy. See OCCIPITO FRONTALIS.

OCCIPITO-FRONTALIS. In anatomy. Digastricus cranii. Epicranius of Albinus. Frontalis et occipitalis of Winslow. A single broad digastric muscle, that covers the cranium, pulls the skin of the head backwards, raises the eyebrows upwards, and, at the same time, draws up and wrinkles the skin of the forehead. It arises from the posterior part of the occiput, goes over the upper part of the os parietale and os frontis, and is lost in the eye-brows.

OCCIPUT. (*occiput.*) The hinder part of the head. See CAPUT.

OCCI'SION. *s.* (from *occisio*, Latin.) The act of killing.

To OCCLU'DE. *v. a.* (*occludo*, Latin.) To shut up (*Brown*).

OCCLU'SE. *a.* (*occlusus*, Latin.) Shut up; closed (*Holder*).

OCCLU'SION. *s.* (*occlusio*, Latin) The act of shutting up.

OCCU'LT. *a.* (*occultus*, Latin.) Secret; hidden; unknown; undiscoverable (*Newton*).

OCCULTATION, the obscuration, or hiding from our sight, any star or planet, by the interposition of the body of the moon, or of some other planet. The occultation of a star by the moon, if observed in a place whose latitude and longitude are well determined, may be applied to the correction of the lunar tables; but if observed in a place whose latitude only is well known, may be applied to the determining the longitude of the place.

OCCU'LTNESS. *s.* (from *occult.*) Secretness; state of being hid.

O'CCUPANCY. *s.* (*occupans*, Lat.) The act of taking possession (*Warburton*).

O'CCUPANT. *s.* (*occupans*, Lat.) He that takes possession of any thing (*Bacon*).

To O'CCUPATE. *v. a.* (*occupo*, Lat.) To possess; to hold; to take up (*Bacon*).

OCCUPA'TION. *s.* (*occupatio*, Latin.) 1. The act of taking possession (*Bacon*). 2. Employment; business (*Wake*). 3. Trade; calling; vocation (*Shakspeare*).

O'CCUPIER. *s.* (from *occupy.*) 1. A possessour; one who takes into his possession (*Raleigh*). 2. One who follows any employment (*Ezek.*).

To O'CCUPY. *v. a.* (*occupier*, French; *occupo*, Lat.) 1. To possess; to keep; to take up (*Brown*). 2. To busy; to employ (*Ecclus*). 3. To follow as business (*Common Prayer*). 4. To use; to expend (*Exodus*).

To O'CCUPY. *v. n.* To follow business (*Luke*).

To OCCU'R. *v. n.* (*occurro*, Lat.) 1. To be presented to the memory or attention (*Bacon*). 2. To appear here and there (*Locke*). 3. To clash; to strike against; to meet (*Bentley*). 4. To obviate; to make opposition to (*Bentley*).

OCCU'RRENCE. *s.* (*occurrence*, French.) 1. Incident; accidental event (*Locke*). 2. Occasional presentation (*Watts*).

OCCU'RRENT. *s.* (*occurrent*, French; *occurrens*, Lat.) Incident; any thing that happens (*Bacon*(.

OCCU'RSION. *s.* (*occursum*, Lat.) Clash; mutual blow (*Boyle*).

OCEAN, in geography, the vast collection of salt and navigable water which encompasses the whole globe of the earth.

The word comes from the Latin *oceanus*, of the Greek ωκεανος which Eustathius derives from ωκεως ναειν, to slide swiftly; others say the Greeks borrowed it from the Phœnicians, who called the circumference of the ocean, *og*; from the Hebrew חוג, hhog, circuit, ambit.

The ocean is that huge body of waters in which the two grand continents known to us, the new and old, are inclosed like islands.

By computation it appears, that the ocean takes up considerably more of what we know of the terrestrial globe than the dry land. Dr. Keill computes the surface of the whole ocean to be 85490506 square miles: so that, supposing the depth of the ocean at a medium to be ¼ of a mile, the quantity of water in the whole will be 21372626¼ cubic miles. See GLOBE, and MAGNITUDE OF THE EARTH.

The ocean, penetrating the land at several streights, quits its name of ocean, and assumes that of sea, or gulph; to which are usually added some epithets to distinguish it: as Mediter-

ranean sea, Persian gulph, &c. In very narrow places it is called streight, *sinus*.

The ocean takes different names, according to the divers countries it borders on: as the British ocean, German ocean, &c. According to Maty, the ocean may be commodiously divided into superior, or upper; and inferior, or lower.

Upper ocean, which the ancients called the exterior, as environing all the known parts of the world, he subdivides, according to the four cardinal points, into the northern, southern, eastern, and western.

Northern ocean, called also the glacial, frozen, and Scythian, is that part of the upper ocean next the north pole; bounded on the south with the arctic circle, and the northern coasts of Europe, Asia, and America; and on the north with the unknown lands about the pole.

It is called the icy or frozen ocean, because those who have attempted a passage through it to China, &c. have always been stopped with the ice; and Scythian ocean, because washing the coasts of Scythia.

Western, or *Atlantic ocean*, is that part of the grand ocean which washes the western coasts of Europe and Africa, and the eastern of America, extending from the arctic circle to the equinoctial.

Southern, or *European ocean*, is that part reaching from the equinoctial to the unknown antarctic lands.

Eastern, or *Indian ocean*, has its first name from its situation to the east; as its latter from India, the chief country it washes. It reaches from the coast of Ajan to the Isle aux Latrons, i. e. of Thieves.

It washes the shores of the eastern coasts of Africa, and the south of Asia, and is bounded on the east by the Indian islands, and the southern continent.

Inferior, or *American ocean*, is that vast part of the grand ocean which washes the coast of America; unknown, in great measure at least, to the ancients. It is divided into three parts, viz.

The North sea, which washes the eastern coasts of America, from the arctic circle to the torpic of Capricorn.

The Magellanic sea, extending from the tropic of Capricorn to the *terra australis incognita*.

The South sea, or Pacific, which washes the western coasts of America to the east, as far as the Isle of Thieves; and from south to north, from the tropic of Capricorn to the land of Jesso.

O'CEAN. *a.* Pertaining to the main or great sea (*Milton*).

OCEA'NIC. *a.* (from *ocean*.) Pertaining to the ocean.

OCEANIDES and OCEANITIDES, sea nymphs, daughters of Oceanus, from whom they received their name, and of the goddess Tethys. They were 3000 in numuer, according to Apollodorus, who mentions seven of them. Hesiod speaks of the eldest of them, and reckons 41. Hyginus mentions 16, whose names are almost all different from those of Apollodorus and Hesiod. The Oceanides, as the rest of the inferior deities, were honoured with libations and sacrifices. Prayers were offered to them, and they were entreated to protect sailors from storms and dangerous tempests.

OCEANUS, in pagan mythology, a powerful deity of the sea, son of Cœlus and Terra. He married Tethys, by whom he had the most principal rivers, such as the Alpheus, Peneus, Strymon, &c with a number of daughters, who are called from him Oceanides. (See OCEANIDES.) According to Homer, Oceanus was the father of all the gods, and on that account he received frequent visits from the rest of the deities. He is generally represented as an old man, with a long flowing beard, and sitting upon the waves of the sea. Oceanus presided over every part of the sea, and even the rivers were subjected to his power.

OCELLATE, in natural history, having eye-like spots, the external ring of which when of a different colour is called the iris, and the central spot the pupil.

OCELLUS the Lucanian, an ancient Greek philosopher of the school of Pythagoras, who lived before Plato. His work περι τε Παντος, or "The Universe," is the only piece of his which is come down entire to us; and was written originally in the Doric dialect, but was translated by another hand into the Attic. William Christian, and after him Lewis Nogarola, translated this work into Latin; and we have several editions of it, both in Greek and Latin.

OCELOT, the Mexican cat. See FELIS.

OCHEMA. (from οχεω, to carry.) A vehicle or thin fluid in which a denser medicine is deposited for its easier administration.

OCHEUS. (from οχεω, to carry). The bag of the scrotum.

OCHINUS (Bernardin), an Italian. He was at first a cordelier, then studied physic, and again returned to the church, and in 1534 became a strict capuchin, and rose to be the vicar-general of the order. Paul III. made him his confessor; but still inconsistent, he became a convert to the tenets of Luther. Escaping from Italy, he, after visiting Geneva, Lucca, and Augsburg, came to England with Peter Martyr, 1547, and was by Cranmer made prebendary of Canterbury. On the death of Edward VI. he retired to Strasburg, to avoid persecution, and then went to Basil, and settled at Zurich. After presiding eight years over the Italian church in that city, he was banished by the magistrates 1563, for publishing dialogues in favour of polygamy. He fled to Moravia and Poland, where he joined the socinians. He died of the plague at Slakew, 1564, aged 77. He was author of some controversial works, and of sermons in Italian, five vols. 8vo.

OCHLOCRASY, the form of government in which the populace have the chief administration of affairs.

OCHNA, in botany, a genus of the class polyandria, order monogynia. Calyx five-leaved; petals from five to twelve; berry one-seeded, fixed to a large roundish receptacle. Two species only, though sometimes more are er-

roneously ascribed to this genus. One an East-Indian tree, with alternate oblong leaves; the other an Arabian shrub with one-flowered peduncles, and an ash-coloured dotted bark.

OCHRA. (*ochra*, ωχρα, from ωχρος, pale; so named because it is often of a pale colour). Ochre. An argillaceous earth impregnated with iron of a red or yellow colour. The Armenian bole, and other earth, are often adulterated with ochre.

O'CHREOUS. *a.* (from *ochre.*) Consisting of ochre (*Woodward*).

O'CHREY. *a.* (from *ochre.*) Partaking of ochre (*Woodward*).

OCHROMA, in botany, a genus of the class monadelphia, order pentandria. Calyx double, the outer three-leaved; petals five; anthers anfractuous; capsule five-celled, many-seeded; seeds invested with wool. One species: a West-Indian tree from twenty to forty feet high, with spreading fragile branches; leaves large, scattered, rounded and hearted, with from five to seven angles, downy underneath; peduncles terminal, solitary, one-flowered; flowers pale rufous; capsule a foot or more long, somewhat cylindrical, with five grooves and ten angles; wool of the seeds pale rufous. This plant is often denominated down-tree or cork-wood. The wool or down is short, soft, and silky, and sometimes used to stuff beds and pillows; but, like other vegetable downs, is apt to get into clots. The dried wood is so very light and buoyant as to be used by the fishermen of Jamaica for their nets instead of pieces of cork.

OCIMUM. Basil. In botany, a genus of the class didynamia, order gymnospermia. Calyx with the upper lip orbicular; lower lip four-cleft; corol reversed; one lip four-cleft, the other undivided; outer stamens with a process at the base. Twenty-seven species, mostly natives of the East Indies. The following are those chiefly cultivated.

1. O. basilicum. Common sweet basil. Stem erect, downy, round; leaves pubescent, brownish-red, waved, smelling like cloves; flowers white, small, in spiked racemes. It has many varieties and sub-varieties.

2. O. minimum. Bush-basil. A low bushy plant, seldom more than six inches high, branching from the bottom, and forming an orbicular head; leaves small, smooth, or short peduncles; flowers in whorls towards the top of the branches, smaller than those of the first sort, and seldom succeeded by ripe seeds in our own country. A native of Ceylon; flowers, as does the preceding, in July and August. This also has many varieties, with black, purple, or other coloured leaves.

3. O. tenuiflorum. Slender-spiked basil. Stem from one to two feet high; roundish, purple, brachiate; leaves bluntly serrate, soft, on long petioles; spikes terminating in threes, long, narrow, peduncled; with opposite, smooth bractes, closely reflex. A native of Malabar.

All these may be propagated from seeds, which should be sown in March upon a moderate hot-bed. When the plants are come up, they should be transplanted into another bed of a moderate heat; observing to shade and water them till they have taken root. In mild weather they should have air admitted to them, and in May let them be taken up with a ball of earth to their roots, and transplanted either into pots or borders, taking care to shade them till they have taken new root; after which they will require no particular culture, but to be cleared from weeds, and refreshed with water in dry weather. These plants may be also propagated by cuttings, which should be taken off any time in May and planted in a moderate hot-bed, observing to water and shade them for about two weeks, in which time they will have taken root, and in three weeks be fit to be transplanted either into pots or borders with the seedling plants. In September they will perfect their seeds, when those sorts that appear the most distinct should have their seeds preserved separate for sowing the following spring.

OCKLEY, (Simon), a divine and orientalist, born at Exeter, 1678. He was educated at Queen's college, Cambridge, and in 1705 was made vicar of Swavesey, Cambridgeshire, and 1711, Arabic professor to the university. He died 1720. He was well skilled in oriental literature. He published, 1706, Introductio ad Linguas Orientales; the History of the present Jews throughout the World, &c.

OCNUS, a son of the Tiber and of Manto, who assisted Æneas against Turnus. He built a town which he called Mantua, after his mother's name. Some suppose that he is the same as Bianor.—2. A man remarkable for his industry. He had a wife as remarkable for her profusion. She always lavished whatever the labours of her husband had earned. He is represented as twisting a cord, which an ass standing by eats up as soon as made, whence the proverb of the cord of Ocnus, often applied to labour which is totally lost.

OCRISIA, the wife of Corniculus, was one of the attendants of Tanaquil the wife of Tarquinius Priscus, and the mother of Servius Tullius, the sixth king of Rome, whom, according to Plutach, Pliny, &c. she brought forth from a miraculous conception.

OCTACTERIS, a cycle or term of eight years, in the Grecian chronology, at the conclusion of which three entire lunar months were added. This cycle was in use till Meton's invention of the golden number, or cycle of 19 years, superseded it.

OCTAGON. *s.* (οκτω and γωνια.) In geometry, a figure consisting of eight sides and angles. This, when all the sides and angles are equal, is called a regular octagon, or one which may be inscribed in a circle. If the radius of a circle circumscribing a regular octagon, be $= r$, and the side of the octagon $= y$; then $y = \sqrt{2r^2 - r\sqrt{2r^2}}$.

OCTAGON, in fortification, denotes a place that has eight bastions.

OCTAGONAL. *a.* Having eight sides and angles.

OCTAHEDRON, or **OCTAEDRON,** in geometry, one of the five regular bodies, consisting of eight equal and equilateral triangles. (See the article BODY.) The square of the edge of the octahedron is to the square of the diameter of the circumscribing sphere, as 1 to 2. If the diameter of the sphere be 2, the solidity of the octahedron inscribed in it will be 1.33333, nearly. The octahedron is two pyramids put together at their bases, therefore its solidity may be found by multiplying the quadrangular base of either of them, by one-third of the perpendicular height of one of them, and then doubling the product.

OCTANDRIA. (οκτω, eight, and ανηρ, a man, or husband,) The eighth class in Linnéus's sexual system; consisting of plants with hermaphrodite flowers, which are furnished with eight stamens, or male organs of generation. See BOTANY.

OCTA'NGULAR. *a.* (*octo* and *angulus,* Lat.) Having eight angles.

OCTA'NGULARNESS. *s.* (from *octangular.*) The quality of having eight angles.

OCTANT, or **OCTILE,** in astronomy, that aspect of two planets, wherein they are distant an eighth part of a circle, or 45° from each other.

OCTAPLA, in matters of sacred literature, denotes a polyglot bible consisting of eight columns, and as many different versions of the sacred text; viz. the original Hebrew both in Hebrew and Greek characters, Greek versions, &c.

OCTATEUCH, an appellation given to the eight first books of the Old Testament.

OCTAVE, in music, an harmonical interval, consisting of eight tones, or degrees of sound.

The most simple perception the soul can have of true sounds is that of unison; because the vibrations there begin and end together. The next to this is the octave; wherein the more acute sound makes precisely two vibrations, while the graver or deeper makes one; and wherein, by consequence, the vibrations of the two meet at every vibration of the more grave.

Hence unison and octave pass almost for the same concord. Hence also the proportion of the sounds that form the octave is in numbers, or in lines, as 2 to 1, so that two chords or strings of the same matter, thickness, and tension, one whereof is double the length of the other, produce the octave.

The octave is called, by the ancients, diapason, because containing all the simple tones and concords; all of which derive their sweetness from it, as they arise more or less directly out of it.

To be just, it must contain diatonically seven degrees, or intervals; and, consequently, eight terms, or sounds: whence its name, octave.

The octave containing in it all the other simple concords, and the degrees being the differences of these concords; it is evident, the division of the octave comprehends the division of all the rest.

By joining, therefore, all the simple concords to a common fundamental, we have the following series:

1 ;	$\frac{5}{6}$:	$\frac{4}{5}$:	$\frac{3}{4}$:	$\frac{2}{3}$:	$\frac{5}{8}$:	$\frac{3}{5}$:	$\frac{1}{2}$.
Fund.	3d l,	3d g,	4th,	5th,	6th l,	6th g,	8 ve.

Again, the system of the octave containing all the original concords, and the compound concords being the sum of the octave, and some less concord; in order to have a series to reach beyond an octave we must continue them in the same order through a second octave, as in the first; and so on through a third and fourth octave. Such a series is called the scale of music.

Though the composition of octaves may be carried on infinitely, yet three or four octaves are the greatest length we go in ordinary practice: the old scales went no farther than two, or at most three octaves, which is the full compass of an ordinary voice: and, notwithstanding the perfection of the octave; yet, after the third, the agreement diminishes very fast; nor do they ever go so far at one movement, as from one extreme to the other of a double or triple octave; seldom beyond a single octave: nor is either voice or instrument well able to go beyond. To form a fourth octave, if the acuter string be half a foot, which is but a small length to give a clear sound, the longer must be eight feet. If, then, we go beyond the fourth octave, either the acute term will be too short, or the grave one too long.

The octave is not only the greatest interval of the seven original concords, but the first in degree of perfection. As it is the greatest interval, all the less are contained in it. Indeed, the manner wherein the less concords are found in the octave is somewhat extraordinary; viz. by taking both an harmonical and arithmetical mean between the extremes of the octave, and then both an arithmetical and harmonical mean between each extreme, and the most distant of the two means last found; i.e. between the last extreme and the first arithmetical, and between the greater extreme and the first harmonical mean, we have all the lesser concords.

Mr. Malcolm observes, that any wind-instrument being over-blown, the sound will rise to an octave, and no other concord; which he ascribes to the perfection of the octave, and its being next to unison. This ingenious writer was in error with regard to this supposed fact. All the natural harmonics may be produced on a wind-instrument by its being over-blown. Thus, if the breath when propelled into a flute with a certain velocity, with all the holes covered, caused it to emit the tone or sound D; breath impelled with a double velocity will produce the sound D an octave above; a triple velocity will produce the sound G a twelfth above the fundamental tone;

a quadruple velocity will produce D the fifteenth, or double octave; a quintuple velocity will produce the sound F sharp, a seventeenth above the primitive tone, and so on. See HARMONICS.

OCTAVE denotes also the eighth day after a festival of the church.

OCTAVIA, a Roman lady, sister to the emperor Augustus, and celebrated for her beauty and virtues. She married Claudius Marcellus, and after his death M. Antony. Her marriage with Antony was a political step to reconcile her brother and her husband. Antony proved for some time attentive to her, but he soon after despised her for Cleopatra; and when she attempted to withdraw him from this unlawful amour, by going to meet him at Athens, she was totally banished from his presence. This affront was highly resented by Augustus, who resolved to revenge her cause by arms, which he ultimately did. Marcellus, her son by her first husband, was married to a niece of Augustus, and was publicly intended as a successor to his uncle; but his sudden death plunged all his family into the greatest grief. Virgil, upon this occasion, in his Æneid, paid a melancholy tribute to the memory of a young man whom Rome regarded as her future father. He was desired to repeat his composition in the presence of Augustus and of his sister. Octavia burst into tears as soon as the poet began, but when he mentioned Tu Marcellus eris, she swooned away. This pathetic encomium upon the virtues of young Marcellus was liberally rewarded by Octavia, and Virgil received 10,000 sesterces for every one of the verses. Octavia had two daughters by Antony, Antonia Major and Antonia Minor. The death of Marcellus continually preyed upon the mind of Octavia, who died of melancholy about 10 years before the Christian era.—2. A daughter of the emperor Claudius by Messalina. She was betrothed to Silanus, but by the intrigues of Agrippina, she was married to the emperor Nero in the 16th year of her age, but was soon after divorced on pretence of barrenness. She was afterwards, by the intrigues of Poppæa, banished, and was ordered to kill herself by opening her veins. Her head was cut off, and carried to Poppæa.

OCTAVIANUS, or OCTAVIUS CÆSAR. Vid. AUGUSTUS.

OCTAVIUS. This name was common to many eminent Romans, but of celebrity inferior to Octavius Cæsar, afterwards Augustus.—2. A man who opposed Metellus in the reduction of Crete, by means of Pompey. He was obliged to retire from the island.

OCTA'VO. (Latin.) A book is said to be in octavo when a sheet is folded into eight leaves.

OCTE'NNIAL. *a.* (from *octennium*, Lat.) 1. Happening every eighth year. 2. Lasting eight years.

OCTOBER, in chronology, the tenth month of the Julian year, consisting of thirty-one days: it obtained the name of October from its being the eighth month in the calendar of Romulus. See the articles MONTH and YEAR.

OCTOBLEPHARUM. In botany, a genus of the class cryptogamia, order musci. Capsule ovate, fringe simple, of eight unconnected teeth. One species only, an exotic moss.

OCTOE'DRICAL. *a.* having eight faces.

OCTOFID CALYX. In botany, an eight-cleft calyx, as in tormentilla. See CLEFT.

OCTO'GENARY. *a.* (from *octogeni*, Lat.) Of eighty years of age.

O'CTONARY. *a.* (*octonarius*, Latin.) Belonging to the number eight.

OCTONO'CULAR. (*octo* and *oculus*, Lat.) Having eight eyes (*Derham*).

OCTOPE'TALOUS. *a.* (ὀκτὼ and πέταλον) Having eight flower leaves.

O'CTOSTYLE. *s.* (ὀκτὼ and στῦλος.) The face of a building or ordonnance containing eight columns (*Harris*).

O'CTUPLE. *a.* (*octuplus*, Latin.) Eightfold.

O'CULAR. *a.* (from *oculus*, Latin.) Depending on the eye; known by the eye.

OCULARIA. (from *oculus*, the eye, so called from its uses in disorders of the eye.) In botany. See EUPHRASIA.

O'CULARLY. *ad.* (from *ocular.*) To the observation of the eye (*Brown*).

O'CULATE. *a.* (*oculatus*, Latin.) Having eyes; knowing by the eye.

OCULI ADDUCTOR. In myology, see RECTUS INTERNUS OCULI.

OCULI ATTOLLENS. See RECTUS SUPERIOR OCULI.

OCULI CANCRORUM. See CANCER.

OCULI DEPRESSOR. See RECTUS INFERIOR OCULI.

OCULI ELEVATOR. See RECTUS SUPERIOR OCULI.

OCULI LEVATOR. See RECTUS SUPERIOR OCULI.

OCULI OBLIQUUS INFERIOR. See OBLIQUUS INFERIOR OCULI.

OCULI OBLIQUUS MAJOR. See OBLIQUUS SUPERIOR OCULI.

OCULI OBLIQUUS MINOR. See OBLIQUUS INFERIOR OCULI.

O'CULIST. *s.* (from *oculus*, Latin.) One who professes to cure distempers of the eyes (*Bacon*). The most celebrated oculists of the present day are Mr. Ware and Mr. Phipps.

OCULUS. See ANATOMY and EYE.

OCULUS CATI. See ASTERIA.

OCULUS MUNDI. See HYDROPHANES.

OCYNUM. See OCIMUM.

OCYPETE, one of the harpies, who infected whatever she touched. The name signifies swift flying.

OCYROE, a daughter of Chiron, who had the gift of prophecy. She was changed into a mare. (Vid. Melanippe.)

OCZAKOW, or OCZAKOFF, a town and fortress, lately of Turkey in Europe, but now included in the Russian government of Catha-

rinenslaf. It is seated at the mouth of the Dnieper, opposite Kinburn, 50 miles W. of Cherson and 190 N. by E. of Constantinople. Lon. 30. 50 E. Lat. 46. 50 N.

ODA, in the Turkish seraglio, signifies a class, order, or chamber. Hence Oda Bachi, is an officer in the Turkish service.

ODD. *a.* (*udda*, Swedish.) 1. Not even; not divisible into equal numbers (*Brown*). 2. More than a round number (*Burnet*). 3. Particular; uncouth; extraordinary (*Pope*). 4. Not noted; not taken into the common account; unheeded (*Shakspeare*). 5. Strange; unaccountable; fantastical (*Swift*). 6. Uncommon; particular (*Ascham*). 7. Unlucky (*Shakspeare*). 8. Unlikely; in appearance improper (*Addison*).

O'DDLY. *ad* (from *odd*.) 1. Not evenly. 2. Strangely; particularly; unaccountably; uncouthly (*Locke*).

ODDLY ODD. A number is said to be oddly-odd, when an odd number measures it by an odd number. So 15 is a number oddly-odd, because the odd number 3 measures it by the odd number 5.

O'DDNESS. *s.* (from *odd*.) 1. The state of being not even. 2. Strangeness; particularity; uncouthness; irregularity (*Dryden. Collier*).

ODDS. *s.* (from *odd*.) 1. Inequality; excess of either compared with the other (*Hooker*). 2. More than an even wager; more likely than the contrary (*Swift*). 3. Advantage; superiority (*Hudibras*). 4. Quarrel; debate; dispute (*Shakspeare*).

ODE. *s.* (ᾠδὴ.) A poem written to be sung to music; a lyric poem. Ode, in the modern poetry, is a lyric poem, consisting of long and short verses, distinguished into stanzas, or strophes, wherein the same measure is preserved throughout.

The odes of the ancients, Vossius observes, had a regular return of the same kind of verse, and the same quantity of syllables, in the same place of every similar verse: "But there is nothing (says he) but confusion of quantities in the modern odes; so that, to follow the natural quantity of our syllables, every stanza will be a different song."

He should have observed, however, that all the ancient odes were not of such kind. But he proceeds: "The moderns have no regard to the natural quantity of the syllables, and have introduced an unnatural and barbarous variety of long and short notes, which they apply without any regard to the natural quantity of syllables; so that it is no wonder our vocal music has no effect." De Poem. Cantu.

Among the ancients, ode signified no more than a song; with us, they are different things. The ancient odes were generally in honour of their gods, as are many of those of Pindar and Horace: sometimes on other subjects, as those of Anacreon, Sappho, &c. The English odes are generally composed in praise of heroes, and great exploits; as those of Dryden, Prior, &c.

The distinguishing character of the ode is sweetness: the poet is to sooth the minds of his readers by the variety of verse, and the delicacy of words; the beauty of numbers, and the description of things most delightful in themselves. Variety of numbers is essential to the ode.

At first, indeed, the verse of the ode was but of one kind; but for the sake of pleasure, and the music to which they were sung, they by degrees so varied the numbers and feet, that their kinds are now almost innumerable. One of the most considerable is the Pindaric, distinguished by the boldness and rapidity of its flights.

The ancient ode had originally but one stanza, or strophe: but was at last divided into three parts; strophe, antistrophe, and epode. The priests going round the altar, singing the praise of the gods, called their first entrance strophe, i. e. turning to the left; the second, turning to the right, they called antistrophe, q. d. returning: lastly, standing still before the altar, they sung the remainder; which they called epode.

Among the modern English odes the most distinguished are Dryden's ode on St. Cecilia's day, and Collins's ode on the Passions.

ODE (Alcaic). See ALCAIC.

ODENATUS, a celebrated prince of Palmyra. He early inured himself to bear fatigues, and accustomed himself to the labours of a military life. He was faithful to the Romans, and when Aurelian had been taken prisoner by Sapor, king of Persia, Odenatus warmly interested himself in his cause. Sapor ordered him, in consequence of his solicitations in favour of Aurelian, to appear before him, on pain of being devoted to instant destruction with all his family. Odenatus disdained the summons of Sapor, opposed force to force, and obtained some advantages over the troops of the Persian monarch. For these services, Gallienus, the then reigning emperor, named Odenatus as his colleague on the throne, and gave the title of Augustus to his children, and to his wife the celebrated Zenobia. He perished, some time after, by the dagger of one of his relations, at Emessa, about the 267th year of the Christian æra. Zenobia succeeded to all his titles and honours.

ODENSEE, a town of Denmark, capital of the isle of Funen, and a bishop's see. It supplies the greatest part of the army with all their leather accoutrements, and is particularly famous for gloves. Here are also manufactures of cloth, sugar, and soap. It is situate on a river, six miles from the bay of Stegestrand, and 90 W. by S. of Copenhagen. Lon. 10. 17 E. Lat. 55. 30 N.

ODER, a river of Germany, which has its source in the mountains of Moravia, and flows N. to Oderberg: then passes by Ratibor, Oppeln, Breslau, and Glogau, in Silesia; Crossen, Frankfort, Lebus, Custrin, and Frinwalt, in Brandenburg; and Gartz, Stettin, Camin, Wollin, Usedom, and Wolgast, in Pomerania. Below Stettin it forms a large lake or bay, called Gross Haff, and then enters the Baltic sea by three channels, called Peene, Swin, and

Diwenow; between which lie the islands of Usedom and Wollin.

ODESSA, a fortified seaport of Russia, in the government of Catherinenslaf, seated on a gulf of the Black Sea, 44 miles W. by S. of Oczakow. Lon. 29. 24 E. Lat. 46. 28 N.

Odessa is now rising into great opulence. When Mr. Macgill visited it in 1805, though it had then scarcely existed four years, it contained a population of 10,000 persons. The houses are well built of freestone, and the streets are regular. There is a secure harbour for vessels of considerable burthen, and a mole or quay extending above a quarter of a mile into the sea. A thousand ships have been loaded in this port in a single year; and the resort of the Polish nobles to this thriving town renders it a very gay and lively place.

ODEUM, in Grecian antiquity, a music-theatre, built by Pericles; the inside of which was filled with seats and ranges of pillars, and on the outside the roof descended shelving downwards from a point in the centre, with many bendings, in imitation of the king of Persia's pavilion. Here the musical prizes were contended for; and here also, according to Aristophanes, was a tribunal.

ODEYPOUR, a town of Hindostan, capital of Jushpour, in the province of Orissa. It is 60 miles N.E. of Ruttunpour, and 220 N.W. of Cattack. Lon. 83. 22 E. Lat. 22. 37 N.

O'DIBLE. *a.* (from *odi*, Lat.) Hateful.

ODIHAM, a town in Hampshire, with a market on Saturday. Here are the remains of an ancient castle, and of a royal palace, barns, &c. It is seated on the Basingstoke canal, 24 miles N.E. of Winchester, and 42 W. by S. of London.

ODIN (see FREA), in mythology, called also in the dialect of the Anglo-Saxons Woden or Wodan, a name given by the ancient Scythians to their supreme god, and assumed, about 70 years before the Christian era, by Sigge, a Scythian prince, who conquered the northern nations, made great changes in their government, manners, and religion, enjoyed great honours, and had even divine honours paid him. According to the account given of this conqueror by Snorro, the ancient historian of Norway, and his commentator Torfæus, Odin was a Scythian, who withdrew himself, with many others in his train, by flight, from the vengeance of the Romans under the conduct of Pompey: and having officiated as priest in his own country, he assumed the direction of the religious worship, as well as the civil government, of the nations which he conquered. Having subdued Denmark, Sweden, and Norway, he retired to Sweden, where he died. There is nothing certain in this account; but it is probable, that the god, whose prophet or priest this Scythian pretended to be, was named Odin, and that the ignorance of succeeding ages confounded the deity with his priest, composing out of the attributes of the one, and the history of the other, the character of the northern conqueror. He deluded the people by his enchantments and skill in magic: having cut off the head of one Mimer, who in his lifetime was in great reputation for wisdom, he caused it to be embalmed, and persuaded the Scandinavians that he had restored it to the use of speech; and he caused it to pronounce whatever oracles he wanted. The Icelandic chronicles represent Odin as the most eloquent and persuasive of men; they ascribe to him the introduction of the art of poetry among the Scandinavians, and likewise the invention of the Runic characters. He had also the address to persuade his followers, that he could run over the world in the twinkling of an eye; that he had the direction of the air and tempests; that he could transform himself into all sorts of shapes, could raise the dead, could foretel things to come, deprive his enemies, by enchantment, of health and vigour, and discover all the treasures concealed in the earth. They add, that by his tender and melodious airs he could make the plains and mountains open and expand with delight; and that the ghosts, thus attracted, would leave their infernal caverns, and stand motionless about him. Nor was he less dreadful and furious in battle; changing himself into the shape of a bear, a wild bull, or a lion, and amidst ranks of enemies committing the most horrible devastation, without receiving any wound himself.

ODINUS, a celebrated hero of antiquity, who flourished about 70 years before Christ, in the northern parts of ancient Germany, or the modern kingdom of Denmark. He was at once a priest, a soldier, a poet, a monarch, and a conqueror. He imposed upon the credulity of his superstitious countrymen, by the manner of his death, and made them believe as he expired that he was going into Scythia, where he should become one of the immortal gods.

O'DIOUS. *a.* (*odiosus*, Latin.) 1. Hateful; detestable; abominable (*South*). 2. Exposed to hate (*Clarendon*). 3. Causing hate; invidious (*Milton*).

O'DIOUSLY. *ad.* (from *odious*.) 1. Hatefully; abominably (*Milton*). 2. Invidiously; so as to cause hate (*Dryden*).

O'DIOUSNESS. *s.* (from *odious*.) 1. Hatefulness (*Wake*). 2. The state of being hated (*Sidney*).

O'DIUM. *s.* (Latin). Invidiousness; quality of provoking hate (*King Charles*).

ODO (Saint), second abbot of Clugni, was born at Tours, 879. The sanctity of his life was such, that even kings and popes referred their disputes to his unbiassed judgment. He wrote some religious books, and died 943.

ODOMETER, is an instrument for measuring the ground or distance passed over by a carriage.

The best contrivance for this purpose with which we are acquainted was invented by Richard Lavell Edgeworth, Esq. His description of it is as follows.

This instrument may be easily fixed to the axletree bed of a post-chaise, gig, or any other carriage.

One turn and a half of a screw is framed

round the nave of one of the hinder wheels by a slip of iron three quarters of an inch broad, and one-eighth of an inch thick; this is wound round the nave, and fastened to it by screws passing through five or six cocks, which are turned up at right angles on the slip of iron. The helix so formed on the nave of the carriage wheel acts as a worm or screw upon the teeth of the wheel A, upon the arbor of which another screw of brass B is formed, which acts upon the brass wheel C (fig. I. pl. 122). This wheel C serve also as a dial-plate, and is divided into miles, halves, quarters, and furlongs; the figures indicating the miles are nearly three quarters of an inch long, so as to be quite distinct; they are pointed out by the index D, which is placed as represented in the plate, in such a manner as to be easily seen from the carriage.

These two brass wheels are mounted by the irons E E upon a block of wood F, eight inches long, two inches thick, and five inches broad. This block may be screwed upon the axletree-bed by two strong square-headed wood screws. If the carriage permits, this block should be fixed obliquely on the axletree-bed, so that the dial-plate may be raised up toward the eye of the person looking out from the carriage.

H is a ratchet wheel attached to the arbor of the wheel A, which, by means of the click I, allows the wheel to be set with a key or handle fitted to the squared end of the arbor at K. L is a long spring screwed on the block; it presses on the wheel A, to prevent it from shaking by the motion of the carriage. A small triangular spring is put under the middle of the dial-plate wheel for the same purpose.

If the wheel of the carriage is exactly five feet three inches in circumference, the brass toothed wheel which it turns should have twenty teeth, and that which serves as a dial-plate should have eighty; it will then count five miles. If the carriage wheel is either larger or smaller, a mile should be carefully measured on a smooth road, and the number of turns which the carriage wheel makes in going this mile may easily be counted by tying a piece of fine packthread to one of the spokes, and letting the wheel, as it moves slowly forward, wind up the packthread on its nave. When the wheel has proceeded a half or a quarter of a mile, unwind the string, and count the number of turns which it has made.

By the addition of another wheel of eighty-one teeth, placed under the dial-plate wheel, and moved by the screw C, with a proper hand fitted to it, and proper figures on the dial-plate, this machine would count four hundred miles.

ODONTALGIA. (*odontalgia*, οδονταλγια, from οδους, a tooth, and αλγος, pain.) The tooth-ache.

ODONTALGICA. (*medicamenta odontalgica*, οδονταλγικα, from οδονταλγια, the tooth-ache.) Medicines which relieve the tooth-ache.

ODONTOID PROCESS. (*processus odontoides*, from οδους, a tooth, and ειδος, form; because it is shaped like a tooth.) A process of the second vertebra of the neck. See DENTATUS.

ODONTOLOGY. (οδους, οδοντος, a tooth, and λογος, a treatise, or discourse.) The doctrine of teething, or dentition.

There are few branches of science of so great consequence that have been so little attended to. The different orders of mammalian animals in the Linnéan system are for the most part determined by the peculiarity of the teeth. Much of the comfort of human life, as well as much of the beauty of the human face (notwithstanding that the organ is thrown entirely out of the hands of the regular surgeon, and left entirely at the mercy of persons who for the most part have but slender pretensions to any scientific acquaintance with the subject), are to a considerable extent dependent upon the state of the teeth; and much of the general age, and, consequently, of the real value of that noble animal the horse, as well as of various other animals, is ascertained by their structure and appearance. They are subject to diseases of various kinds, and of the most distressing character: to agony the most excruciating, and to foulness and decay most humiliating, from the fetor they produce.

We shall, therefore, take leave to dwell somewhat more largely, and in a more physiological point of view, upon this important science, than has ever been done, as we believe, in a work of this kind before, or has often been done in any work even of a professional nature.

I. In the first stages of infancy nature designs us for the softest aliment, so that the gums alone are then sufficient for the purpose of manducation; but as we advance in life, and require a different food, she wisely provides us with teeth. These are the hardest and whitest of our bones, and, at full maturity, we usually find thirty-two in both jaws; viz. sixteen above, and as many below. Their number varies indeed in different animals, as well as different human subjects; but it is seldom seen to exceed thirty-two in the last, and it will very rarely be found to be less than twenty-eight.

Each tooth in the human subject may be divided into two parts; viz. its body, or that part which appears above the gums; and its fangs or root, which is fixed into the socket. The boundary between these two, close to the edge of the gum, where there is usually a small circular depression, is called the neck of the tooth. The teeth of each jaw are commonly divided into three classes; but before each of these is treated of in particular, it will be right to say something of their general structure.

Every tooth is composed of its cortex or enamel, and its internal bony substance. The enamel, or as it is sometimes called, the vitreous part of the tooth, is a very hard and compact substance, of a white colour, and peculiar to the teeth. It is found only upon the body of the tooth, covering the outside of the bony or internal substance. When broken it appears fibrous or striated; and all the striæ are directed from the circumference to the centre of the tooth. This enamel is thickest on the grinding surface, and on the cutting edges or points of the teeth, becoming gradually thinner as it approaches the neck, where it terminates insensibly. It would seem to be an earth, united with a portion of ani-

mal substance, as it is not reducible to quick-lime by fire, till it has first been dissolved in an acid: and the experiments of Mr. Hatchet have succeeded in proving the earth of the enamel to be phosphat of lime, as that of the bony part is carbonat.

Some writers have described it as being vascular. but it is certain that no injection will ever reach this substance; that it receives no tinge from madder; and that it affords no appearance of a circulation of fluids. The bony part of a tooth resembles other bones in its structure, but is much harder than the most compact part of bones in general. It composes the inner part of the body and neck, and the whole of the root of the tooth. This part of a tooth, when completely formed, does not, like the other bones, receive a tinge from madder, nor do the minutest injections penetrate into its substance, although many writers have asserted the contrary. Mr. Hunter has been therefore induced to deny its being vascular, although he is aware that the teeth, like other bones, are liable to swellings, and that they are found anchylosed with their sockets. He supposes, however, that both these may be original formations; and, as the most convincing proof of their not being vascular, he reasons from the analogy between them and other bones. He observes, for instance, that in a young animal that has been fed with madder, the parts of the teeth which were formed before it was put on madder diet will appear of their natural colour, but that such parts as were formed while the animal was taking the madder will be of a red colour; whereas, in other bones, the hardest parts are susceptible of the dye, though more slowly than the parts which are growing. Again he tells us, that if you leave off feeding the animal with madder a considerable time before you kill it, you will find the above appearances still subsisting, with this addition, that all the parts of the teeth which were formed after leaving off the madder will be white. This experiment proves that a tooth once tinged does not lose it colour; whereas other bones do (though very slowly) return again to their natural appearance: and, as the dye in this case must be taken into the habit by absorbents, he is led to suspect that the teeth are without absorbents as well as other vessels. These arguments are very ingenious, but they are far from being satisfactory. The facts adduced by Mr. Hunter are capable of a different explanation from that which he has given them; and when other facts are added relative to the same subject, it will appear that this bony part of a tooth has a circulation through its substance, and even lymphatics, although, from the hardness of its structure, we are unable to demonstrate its vessels. The facts which may be adduced are, 1st. We find that a tooth recently drawn and transplanted into another socket becomes as firmly fixed after a certain time, and preserves the same colour as the rest of the set; whereas a tooth that has been long drawn before it is transplanted will never become fixed. Mr. Hunter indeed is aware of this objection, and refers the success of the transplantation, in the first instance, to the living principle possesed by the tooth, and which he thinks may exist independent of a circulation. But however applicable such a doctrine may be to zoophytes, it is suspected that it will not hold good in man, and others of the more perfect animals; and there does not appear to be any doubt but that, in the case of a transplanted tooth, there is a real union by vessels. 2dly. The swellings of the fangs of a tooth, which in many instances are known to be the effects of disease, and which are analogous to the swelling of other bones, are a clear proof of a similarity of structure, especially as we find them invested with a periosteum. 3dly. It is a curious fact, though as yet perhaps not generally known, that, in cases of phthisis pulmonalis, the teeth become of a milky whiteness, and in some degree, transparent; does not this prove them to have absorbents?

Each tooth has an inner cavity, which beginning by a small opening at the point of the fang, becomes larger, and terminates in the body of the tooth.

This cavity is supplied with blood-vessels and nerves, which pass through the small hole in the root. In old people this hole sometimes closes, and the tooth becomes then insensible.

The teeth are invested with a periosteum, from their fangs to a little beyond their bony sockets, where it is attached to the gums. This membrane seems to be common to the tooth which it incloses, and to the sockets which it lines. The teeth are likewise secured in their sockets by a red substance, called the gums, which every where covers the alveolar processes, and has as many perforations as there are teeth. The gums are exceeding vascular, and have something like a cartilaginous hardness and elasticity, but do not seem to have much sensibility. The gums of infants, which perform the offices of teeth, have a hard ridge extending through their whole length; but in old people, who have lost their teeth, this ridge is wanting. The three classes into which the teeth are commonly divided are incisores, canini, and molares or grinders.

The incisores are the four teeth in the fore part of the jaws; they derive their name from their use in dividing and cutting the food in the manner of a wedge, and have each of them two surfaces, which meet in a sharp edge. Of these surfaces, the anterior one is convex, and posterior one somewhat concave. In the upper jaw they are usually broader and thicker, especially the two first, than those of the under jaw, over which they generally fall by being placed a little obliquely.

The canini or cuspidati are the longest of all the teeth, deriving their name from their resemblance to a dog's tusks. There is one of these teeth on each side of the incisores, so that there are two in each jaw. They are the longest of all the teeth. Their fangs differ from that of the incisores only in being much larger, and their shape may be easily described to be that of an incisor with its edge worn off, so as to end in a narrow point instead of a thin edge. The canini not being calculated for dividing like the incisores, or for grinding, seem to be intended for laying hold of substances. Mr. Hunter remarks of these teeth, that we may trace in them a similarity in shape, situation, and use, from the most imperfect carnivorous animal, which we believe to be the human species, to the lion, which is the most perfectly carnivorous.

The grinders, or molares, of which there are ten in each jaw, are so called, because from their size and figure they are calculated for grinding the food. The canini and incisores have only one fang, but the three last grinders in the under

jaw have constantly two fangs, and the same teeth in the upper jaw three fangs. Sometimes these fangs are divided into two points near their base, and each of these points has, perhaps, been sometimes considered as a distinct fang. The grinders likewise differ from each other in their appearance. The two first on each side, which Mr. Hunter appears to have distinguished very properly by the name of bicuspides, seem to be of a middle nature between the incisores and grinders; they have in general only one root, and the body of the tooth terminates in two points, of which the anterior one is the highest, so that the tooth has in some measure the appearance of one of the canini. The two grinders beyond these, on each side, are much larger. Their body forms almost a square with rounded angles; and their grinding surface has commonly five points or protuberances, two of which are on the inner, and three on the outer part of the tooth. The last grinder is shorter and smaller than the rest, and, from its coming through the gums later than the rest, and sometimes not appearing till late in life, is called dens sapientiæ. The variation in the number of teeth usually depends on these dentes sapientiæ.

Having thus described the appearance of the teeth in the adult; the manner of their formation and growth in the fœtus is next to be considered. We shall find that the alveolar process, which begins to be formed at a very early period, appears about the fourth month, only as a shallow longitudinal groove, divided by slight ridges into a number of intermediate depressions, which are to be the future alveoli or sockets. These depressions are at first filled with small pulpy substances, included in a vascular membrane; and these pulpy substances are the rudiments of the teeth. As these advance in their growth, the alveolar processes become gradually more completely formed. The surface of the pulp first begins to harden; the ossification proceeding from one or more points, according to the kind of tooth that is to be formed. Thus, in the incisores and canini, it begins from one point; in the bicuspides, from two points, corresponding with the future shape of those teeth; and in the molares, from four or five points. As the ossification advances, the whole of the pulp is gradually covered with bone, excepting its under surface, and then the fang begins to be formed. Soon after the formation of this bony part, the tooth begins to be incrusted with its enamel; but in what manner this is deposited we are as yet unable to explain.—Perhaps the vascular membrane, which incloses the pulp, may serve to secrete it. It gradually crystallizes upon the surface of the bony part, and continues to increase in thickness, especially at the points and basis of the tooth, till some time before the tooth begins to pass through the gum; and when this happens, the enamel seems to be as hard as it is afterwards, so that the air does not appear to have the least effect in hardening it, as has been sometimes supposed.—While the enamel is thus forming, the lower part of the pulp is gradually lengthened out and ossified, so as to form the fang. In those teeth which are to have more than one fang, the ossification begins from different parts of the pulp at one and the same time. In this manner are formed the incisores, the canini, and two molares, on each side, making in the whole twenty teeth, in both jaws, which are sufficient for the purposes of manducation in early life. As the fangs of the teeth are formed, their upper part is gradually pushed upwards, till at length, about the seventh, eighth, or ninth month after birth, the incisores, which are the first formed, begin to pass through the gum. The first that appears is generally in the lower jaw. The canini and molares not being formed so soon as the incisores, do not appear till about the twentieth or twenty-fourth month. Sometimes one of the canini, but more frequently one of the molares, appears first.

The danger to which children are exposed, during the time of dentition, arises from the pressure of the teeth in the gum, so as to irritate it, and excite pain and inflammation. The effect of this irritation is, that the gum wastes, and becomes gradually thinner at this part, till at length the tooth protrudes. In such cases therefore we may, with great propriety, assist nature by cutting the gum. These twenty teeth are called the temporary, or milk teeth, because they are all shed between the age of seven and fourteen, and are supplied by others of a firmer texture, with large fangs, which remain till they become affected by disease, or fall out in old age, and are therefore called the permanent, or adult teeth. The rudiments of these adult teeth begin to be formed at different periods. The pulp of the first adult incisor, and of the first adult grinder, may be perceived in a fœtus of seven or eight months, and the ossification begins in them about six months after birth. Soon after birth the second incisor, and the canine tooth on each side, begin to be formed. About the fifth or sixth year the first bicuspis, and about the seventh the second bicuspis begins to ossify. These bicuspides are destined to replace the temporary grinders. All these permanent teeth are formed in a distinct set of alveoli; so that it is not by the growing of one tooth under another, in the same socket, that the uppermost tooth is gradually pushed out, as is commonly imagined; but the temporary teeth, and those which are to succeed them, being placed in separate alveoli, the upper sockets gradually disappear, as the under ones increase in size, till at length the teeth they contain, having no longer any support, consequently fall out. But, besides these twenty teeth, which succeeded the temporary ones, there are twelve others to be added to make up the number thirty-two. These twelve are three grinders on each side in both jaws; and in order to make room for this addition, we find the jaws grow as the teeth grow, so that they appear as completely filled with twenty teeth, as they are afterwards with thirty-two. Hence, in children the face is flatter and rounder than in adults. The first adult grinder generally passes through the gum about the twelfth year; the second, which begins to be formed in the sixth or seventh year, cuts the gum about the seventeenth or eighteenth; and the third, or dens sapientiæ, which begins to be formed about the twelfth year, passes through the gum between the age of twenty and thirty. The dentes sapientiæ have, in some instances, been cut at the age of forty, fifty, sixty, and even eighty years; and it sometimes happens that they do not appear at all. Sometimes likewise it happens, that a third set of teeth appear about the age of sixty or seventy. Diermerboeck tells us that he himself, at the age of fifty-six, had a fresh canine tooth in the place of one he had lost several years before; M. du Fay saw two incisores and two canini cut the gum in a man aged eighty-four; Mr. Hunter has

seen two fore-teeth shoot up in the lower jaw of a very old person; and an account was lately published of a man who had a complete set at the age of sixty. Other instances of the same kind are to be met with in authors. The circumstance is curious, and, from the time of life at which it takes place, and the return of the catamenia, which sometimes happens in women at the same age, it has been very ingeniously supposed, that there is some effort in nature to renew the body at that period.

The teeth are subject to a variety of accidents Sometimes the gums become so affected as to occasion them to fall out, and the teeth themselves are frequently rendered carious by causes which have not hitherto been satisfactorily explained. The disease usually begins on that side of the tooth which is not exposed to pressure, and gradually advances till an opening is made into the cavity: as soon as the cavity is exposed, the tooth becomes liable to considerable pain, from the air coming into contact with the nerve. Besides these accidental means by which the teeth are occasionally affected, old age seldom fails to bring with it sure and natural causes for their removal. The alveoli fill up, and the teeth consequently fall out. The gums then no longer meet in the fore part of the mouth, the chin projects forwards, and the face being rendered much shorter, the whole physiognomy appears considerably altered.

Having thus described the formation, structure, growth, and decay of the teeth, it remains to speak of their uses; the chief of which we know to be in mastication. And here we cannot help observing the great variety in the structure of the human teeth, which fits us for such a variety of food, and which, when compared with the teeth given to other animals, may in some measure enable us to explain the nature of the aliment for which man is intended by nature. Thus, in ruminant animals we find incisores only in the lower jaw, for cutting the grass, and molares for grinding it; in graminivorous animals, we see molares alone: and in carnivorous animals, canine teeth for catching at their prey, and incisores and molares, for cutting and dividing it. But, as man is not designed to catch and kill his prey with his teeth, we observe that our canini are shaped differently from the fangs of beasts of prey, in whom we find them either longer than the rest of the teeth, or curved. The incisores likewise are sharper in those animals than in man. Nor are the molares in the human subject similar to the molares of carnivorous animals; they are flatter in man than in these animals; and, in the latter, we likewise find them sharper at the edges, more calculated to cut and tear the food, and by their greater strength, capable of breaking the bones of animals. From these circumstances, therefore, we may consider man as partaking of the nature of these different classes; as approaching more to the carnivorous than to the herbivorous tribe of animals; but upon the whole formed for a mixed aliment, and fitted equally to live upon flesh and upon vegetables. Those philosophers, therefore, who would confine man wholly to a vegetable food, do not seem to have studied nature. As the molares are the last teeth that are formed, so they are usually the first that fall out; this would seem to prove, that we require the same kind of aliment in old age as in infancy. Besides the use of the teeth in mastication, they likewise serve a secondary purpose, by assisting in the articulation of the voice.

We have said that the different orders of mammalian animals are for the most part determined by the peculiarity of the teeth; and they are determined as follows, premising that these orders are seven, and consist of primates, bruta, feræ, glires, pecora, belluæ, cete.

The primates are distinguished by a nearer approach to the teeth of the human form than is exhibited in the other quadrupeds. The bats, however, which by Linnéus are ranked in this order, differ greatly from the rest.

The bruta have no front or cutting teeth either in the upper or under jaw.

The feræ have generally six cutting teeth, of a somewhat conical shape, both in the upper and under jaw; these are succeeded by strong or sharp fangs or canine teeth; and the grinders are formed into conical or pointed processes.

The glires are furnished with two remarkably large and long fore-teeth, both above and below; but they have no canine or sharp teeth.

The pecora, comprising cattle generally, have no front teeth in the upper jaw, but six or eight in the lower.

The belluæ have obtuse front teeth, varying in number in the different genera.

The cete, or whale tribes, have teeth less osseous than in the preceding orders, and only feed on soft marine animals and vegetables.

III. The age of an animal is often as much distinguished by the structure of the teeth as the tribe or order. As a general example we shall take those of the horse, as it is upon this point that the age, during the most valuable part of this animal's life, is chiefly calculated.

A horse has forty teeth, including the tusks or tushes, which are distinguished as follows:

Twenty-four of them are called grinders, which are placed at the bottom of the mouth, beyond the bars, twelve on each side of the channel, viz. six above, and six on each side. These teeth continue, and do not fail to give place to new teeth in their room, so that they are of no use in distinguishing a horse's age. However, they are subject to wolves teeth.

With reference to the other sixteen, twelve of them are called in their infancy milk or foal teeth, and the remaining four go by the name of tushes.

The twelve foal teeth are short, small, and white teeth, seated on the fore-part of the mouth, six above, and six below.

These change and cast, to give place to other; which, in process of time, become long, large, and yellowish.

These new teeth are distinguished by the different names given them, according to their putting forth, and it is the manner of their coming forth that gives us to know the first years of a horse.

Now of these twelve, four are called nippers, four are called middling teeth, and four go by the name of corner teeth.

The four nippers are seated on the fore-part of the mouth, two above, and two below.

When a horse has put forth these, we conclude that he goes from two and a half to three years.

The middling teeth are placed near the nippers, or gatherers, one above, and one below, on each side of the jaws. They come out and appear between three and a half and four years.

The corner teeth are placed yet more forward

in the mouth, one above, and one below, on each side of the jaws These begin to shoot between the fourth and the fifth year, and are got above the gum at five years.

When surmounted the gum at that age, they become hollow, and mark commonly till seven or eight years.

By marking we mean, that in the hollow, or cavity of the corner teeth, a little black speck is formed; which, from its resemblance, we call the bud or eye of a bean.

But when the horse passes six, the cavity begins to fill, and the black mark disappears by degrees; yet this diminution of the cavity and the mark continues from six till seven and a half.

At eight years the cavity is filled up, and the black mark gone, and in regard that the tooth is then full, even as if it had been shaved, we then say that the horse has razed; which happens a little before the eighth year, and after that the horse does not mark; so that the surest knowledge of his age is then took from his tushes.

The tushes are placed beyond the corner teeth upon the bars, two on each side of the jaws, i. e. one above, and one below, without being preceded by any foal teeth.

The two under tushes are cut sometimes at three years, sometimes at three and a half, sometimes at four; but the two upper tushes appear sometimes at four, sometimes at four and a half; sometimes before, and sometimes after the corner teeth, without any certain rule; and till the age of six they are chamfered within.

About ten years of age the two upper tushes appear much worn, which serves for that age.

After that they grow out in length, and become bare of flesh, because the gum shrinks and retires; and at last, about the fifteenth or sixteenth year, the horse shells.

A horse is not capable of any great fatigue till his tushes have cut the skin.

Most of the Dutch horses are very sickly when their tushes shoot forth; mares have them but seldom, and when they have them they are but very small. For the rest, see the article AGE.

IV. Teething, in delicate animals, and especially among mankind, is the cause of various diseases, and the teeth themselves are subject to diseases as numerous.

The principal diseases to which teething gives rise are symptomatic fever, tooth-rash, cough, ptyalism, diarrhœa, convulsions. The ptyalism and diarrhœa, or unusual secretion of phlegm and of alvine discharge, are usually favourable affections, and tend, in almost all instances, to prevent those of a more serious nature; they only require, therefore, to be moderated. The rest are best opposed by local hæmorrhage, as lancing the gums freely, or exciting alvine discharge by slight aperients.

Breeding the teeth, which usually occurs about the third or fourth month, is usually discovered by a copious discharge of saliva; the infant being pleased with having its gums rubbed with a finger or corol; fretfulness and anxiety; starting in the sleep, and suddenly awaking: there is a considerable degree of fever in many instances, which usually yields to aperients; and often a severe griping, which requires to be moderated by the use of magnesia, or prepared chalk. If the starting and fever be considerable, and especially if accompanied with drowsiness or convulsions, leeches will be found more effectual than merely lancing the gums; two leeches being applied to the neck every day, or every other day, till the symptoms abate. After the bleeding, blisters behind the ears, or on the back, are not to be omitted: antimonial emetics may be exhibited with advantage; and hartshorn drops, as recommended by Sydenham, are often useful.

In cases of convulsions a discreet use of anodynes is an important addition to the above practice; and in general, after free evacuations, they may be safely given either by injections, or by the mouth.

The next source of disease in the production of teeth is that of cutting them; and here, so great is the irritability, that the child, instead of soliciting friction, cannot endure that the gums should be touched. Many of the preceding affections accompany this second process, and may be removed in the same manner. Here, however, the use of the lancet, by setting the tooth instantly at liberty, will often procure instantaneous ease, when nothing else will succeed.

The adult teeth are often much inconvenienced by the accumulation of tufa, or tartar, about their roots; and they are equally injured, and rendered black and unsightly by neglect. Powders slightly rough and austere, or very finely prepared soap, are the best means of keeping them clean, and hence of preserving them sound.

For their injury by peculiar diseases, as sea-scurvy, inflammation, &c. see SCORBUTUS, ODONTITIS, and MEDICINE.

In old age, and often before this period, they become detached from their sockets, grow loose, and fall out. If but a few are thus parted with, and the teeth themselves be not injured, they may be easily replaced, and made sufficiently fast for all purposes of ornament and most purposes of use, by being dextrously tied round the adjoining teeth. If they are lost, generally they should be set, provided they are sound, into a bed of ivory, or seal-bone, finely polished, and accurately adapted to the form of the jaw-bone; if decayed, artificial teeth should be employed in their stead.

As some persons are procaciously born with, others, with equal singularity, cut a new set at an advanced period of life. The writer of this article has been a witness to this phænomenon in a lady of ninety. Dr. Slare, in the Philosophical Transactions, mentions a similar case of a relation of his, whose mature teeth continued till he was eighty, at which time he shed them, and in a few years afterwards had an entire new set that reached all round the jaws: and Mentrelius affirms that he saw at Cleves in 1666 a man of a hundred and twenty years of age who had a new set only two years before, and had cut them with great pain; and another man at the Hague, who, in like manner, cut the teeth of his old age at a hundred and eighteen.

V. Teeth, in their chemical property, consist of two parts, the body of the tooth, and the surrounding enamel. The body of the tooth does not essentially differ from the materials of common bone and consequently consist, of gelatin, albumen, carbonat of lime and phosphate of lime, the latter being in a larger proportion than the former. The enamel of the teeth has its phophate of lime in a much larger proportion still; its gelatin is also in larger quantity, and its albumen in smaller: so that it makes a very near approach to the constituent parts of enamel. According to Fourcroy and Vauquelin, and Mr. Hatchett's ex-

periments do not contravene their conclusions, the carbonat of lime and albumen are reduced to insensible quantities. Their result was as follows:

100 parts of enamel contain

Lime, - -	43,3
Phosphoric acid,	29,67
Gelatin of water,	27,10
Loss, - -	,20
	100

O'DORATE. *a.* (*odoratus*, Latin.) Scented; having a strong scent, whether fetid or fragrant (*Bacon*).

ODORI'FEROUS. *a.* (*odorifer*, Lat.) Giving scent; usually sweet of scent; fragrant; perfumed (*Bacon*).

ODORIFEROUS GLANDS, in anatomy. These glands are situated around the corona glandis of the male, and under the skin of the labia majora and nymphæ of females. They secrete a sebaceous matter, which emits a peculiar odour; hence their name.

ODORI'FEROUSNESS. *s.* (from *odoriferous.*) Sweetness of scent; fragrance.

O'DOROUS. *a.* (*odorus*, Latin.) Fragrant; perfumed; sweet of scent (*Cheyne*).

O'DOUR. *s.* (*odor*, Latin.) 1. Scent, whether good or bad (*Bacon*). 2. Fragrance; perfume; sweet scent (*Clarendon*).

ODYNE. (οδυνη.) In medicine, a termination of many compound words implying pain, whence pleurodyne, pain in the side, or pleura, &c.

ODYSSEY, the name of an epic poem composed by Homer. See HOMER.

OE. This combination of vowels does not properly belong to our language, nor is ever found but in words derived from the Greek, and not yet wholly conformed to our manner of writing: *oe* has in such words the sound of *E*.

OECONO'MICS. *s.* (οικονομικος; *œconomique*, Fr. from *œconomy*. Both it and its derivatives are under *economy*.) Management of household affairs (*L'Estrange*).

OECONOMY denotes the prudent conduct, or discreet and frugal management, whether of a man's own estate or that of another.

OECONOMY (Animal), comprehends the various operations of nature in the generation, nutrition, and preservation of animals. See GENERATION, NUTRITION, &c. The doctrine of the animal œconomy is nearly connected with physiology, which explains the several parts of the human body, their structure, use, &c. See ANATOMY and MEDICINE.

OECUMENICAL signifies the same with general or universal; as, œcumenical council, bishop, &c.

OEDEMA, in medicine. (οιδημα, from οιδεω, to swell.) A synonym of anasarca. See ANASARCA.

OEDEMATIC. OEDE'MATOUS. *a.* (from *oedema.*) Pertaining to an oedema (*Wiseman*).

OEDERA, in botany, a genus of the class syngenesia, order polygamia segregata. Calyx many-flowered; florets tubular, hermaphrodite, with one or two female ligulate ones: receptacle chaffy; seeds crowned with many chaffs. Three species: herbs of the Cape.

ŒDIPUS, in fabulous history, a son of Laius, king of Thebes and Jocasta. Laius, the father of Œdipus, was informed by the oracle, as soon as he married Jocasta, that he must perish by the hands of his son. Such dreadful intelligence awakened his fears, and to prevent the fulfilling of the oracle, he resolved never to approach Jocasta; but his resolutions were violated in a fit of intoxication. The queen became pregnant, and Laius ordered his wife to destroy her child as soon as born. The mother did not obey, yet she gave the child to one of her domestics, with orders to expose him in the mountains. The servants bored the feet of the child, and suspended him with a twig by the heels to a tree on mount Cithæron, where he was soon found by one of the shepherds of Polybus, king of Corinth. The shepherd carried him home, and Peribœa, the wife of Polybus, who had no children, educated him as her own child. The accomplishments of the infant, who was named Œdipus, on account of the swelling of his feet, (οιδεω *tumeo*, ποδες *pedes*,) soon became the admiration of the age. His companions envied him, and one of them told him he was an illegitimate child. This raised his doubts, and he went to consult the oracle of Delphi, and was there told not to return home, for if he did he must necessarily be the murderer of his father, and the husband of his mother. This answer terrified him; he knew no home but the house of Polybus, therefore he resolved not to return to Corinth. He travelled towards Phocis, and in his journey met in a narrow road Laius on a chariot with his arm-bearer. Laius ordered Œdipus to make way for him. Œdipus refused, and a contest ensued, in which Laius and his arm-bearer were both killed. Œdipus, ignorant of the rank of the men whom he had killed, continued his journey, and was attracted to Thebes by the fame of the Sphynx, whose enigma he solved, and obtained, in consequence, from Creon the crown of Thebes. (*Vid.* SPHYNX.) The cruelty of the Sphynx now became an object of public concern; and as the successful explanation of an enigma would end in the death of the Sphynx, Creon, who, at the death of Laius, had ascended the throne of Thebes, promised his crown and Jocasta to him who succeeded in the attempt. The enigma proposed was this: "What animal in the morning walks upon four feet, at noon upon two, and in the evening upon three?" This was left for Œdipus to explain; he came to the monster, and said, that man, in the morning of life, walks upon his hands and his feet; when he has attained the years of manhood, he walks upon his two legs; and in the evening, he supports his old age with the assistance of a staff. The monster was mortified at the true explanation, and dashed his head against a rock and perished. Œdipus then married Jocasta, by whom

he had two sons, Polynices and Eteocles, and two daughters, Ismena and Antigone. Some years after, the Theban territories were visited with a plague; and the oracle declared that it should cease only when the murderer of king Laius was banished from Bœotia. As the death of Laius had never been examined, Œdipus wished to disown the murderer, and at length found that himself had killed his father, and consequently that he had married his mother. In the excess of his grief he put out his eyes, as unworthy to see the light, and banished himself from Thebes, or, as some say, was banished by his own sons. The manner of his death is rather miraculous; it is said that the earth opened, and Œdipus disappeared.

ŒDMANNIA. In botany, a genus of the class diadelphia, order decandria. Calyx two-lipped, the upper-lip cloven, lower-lip setaceous. One species only: a Cape plant, with herbaceous stem; lanceolate, entire, glabrous leaves; and one-flowered peduncles.

OEILIAD. s. (from *oeil*, Fr.) Glance; wink; token of the eye (*Shakspeare*).

OELAND, an island of Sweden, in the Baltic, separated from the coast of Gothland, by a strait 12 miles broad in the narrowest part. It is 80 miles long, but not more than nine broad. The north part has fine forests, and quarries of excellent freestone; but the south part is more level, and very fertile. Both parts abound in alum mines. Borkholm is the chief town, seated on the strait, 22 miles E.N.E. of Calmar. Lon. 16. 50 E. Lat. 56. 48 N.

OELS, a town of Silesia, capital of a principality of the same name, with a castle. It stands on the river Oels, 17 miles E.N.E. of Breslau. Lon. 17. 31 E. Lat. 51. 12 N.

OENANTHE. Water dropwort. In botany, a genus of the class pentandria, order digynia. Florets irregular; the central ones central and barren; fruit crowned with the calyx and styles, covered with a corky coat. Eleven species, chiefly Cape plants, a few indigenous to the south of Europe, and four natives of the ditches and marshes of our own country.

Of these last the most remarkable is O. crocata, hemlock dropwort; with tuberous root, leaflets wedge-form, many-cleft, nearly equal. This umbelliferous plant is an active poison, and has too often proved fatal, by being eaten in mistake instead of water parsnep. The juice, nevertheless, cautiously exhibited, promises to be an efficacious remedy in inveterate scorbutic eruptions. The root of this plant is not unpleasant to the taste, and esteemed to be most deleterious of all the vegetables which this country produces. Mr. Howel, surgeon at Haverfordwest, relates, that eleven French prisoners had the liberty of walking in and about the town of Pembroke. Three of them being in the fields a little before noon, dug up a large quantity of this plant, which they took to be wild celery, to eat with their bread and butter for dinner. After washing it, they all three ate, or rather tasted of the roots. As they were entering the town, without any previous notice of sickness at the stomach, or disorder in the head, one of them was seized with convulsions. The other two ran home and sent a surgeon to him. The surgeon endeavoured first to bleed, and then to vomit him; but those endeavours were fruitless, and he died presently. Ignorant of the cause of their comrade's death, and of their own danger, they gave of these roots to the other eight prisoners, who ate some of them with their dinner. A few minutes afterwards, the remaining two who gathered the plants were seized in the same manner as the first, of which one died; the other was bled, and a vomit with great difficulty forced down, on account of his jaws being as it were locked together This operated, and he recovered, but was some time affected with dizziness in his head, though not sick, or the least disordered in his stomach. The other eight being bled and vomited immediately, were soon well. At Clonmel, in Ireland, eight boys, mistaking this plant for water parsnep, ate plentifully of its roots. About four or five hours after, the eldest boy became suddenly convulsed and died; and before the next morning four of the other boys died in a similar manner. Of the other three, one was maniacal several hours, another lost his hair and nails, but the third escaped unhurt. Stalpaart Vander Wiel mentions two cases of the fatal effects of this root; these, however, were attended with great heat in the throat and stomach, sickness, vertigo, and purging; they both died in the course of two or three hours after eating the root. The Dutch physicians make mention of similar mischief from the use of the same root; and sir Wm. Watson cites an instance of a person who was poisoned by eating the leaves of the plant boiled in pottage. Most brute animals are equally affected by this poison with man. Lightfoot says that a spoonful of the juice of the plant given to a dog rendered him sick and stupid; but that goats eat the plant with impunity.

The great virulence of this plant has not, however, prevented it from being taken medicinally. Dr. Poulteny in a letter to sir Wm Watson observes that a severe and inveterate cutaneous disorder was cured by the juice of the root, though not without exciting the most alarming symptoms. Taken in the dose of a spoonful, in two hours afterwards the head was affected in a very extraordinary manner, followed with violent sickness and vomiting, cold sweats and rigors; but this did not deter the patient from continuing the medicine, in somewhat less doses, till it effected a cure.

ŒNEUS, in fabulous history, a king of Calydon, in Ætolia, son of Parthaon, and Euryte. He married Althæa, the daughter of Thestius, by whom he had Clymenus, Meleager, Gorge, and Dejanira. After Althæa's death, he married Peribœa, the daughter of Hipponous, by whom he had Tydeus. In a general sacrifice, which Œneus made to all the gods upon reaping his fields, he forgot Diana, and the goddess, to revenge this neglect, sent a wild boar to lay waste the country of Calydonia. The animal

was at last killed by Meleager, in a celebrated chace. Sometime after, Meleager died, and Œneus was driven from his kingdom. Diomedes, however, his grandson, soon restored him to his throne; but the continual misfortunes to which he was exposed rendered him melancholy. He exiled himself, and left his crown to his son-in-law Andremon. He died as he was going to Argolis. His body was buried by the care of Diomedes, in a town of Argolis, which from him received the name of Œnea.

OENKJE, in botany, a species of iris. See Iris.

OENOPTÆ, in Grecian antiquity, a kind of censors at Athens, who regulated entertainments, and took care that none drank too much, nor too little.

OENOTHERA Tree primrose. In botany, a genus of the class octandria, order monogynia. Calyx four-cleft, tubular; petals four; capsule four-celled, four-valved, cylindrical, inferior; seeds naked. Fifteen species—almost all of them natives of North or South America. The following are those chiefly cultivated:

1. O. biennis. Broad-leaved tree primrose. Stems alternately branched leaves, ovate-lanceolate, flat; flowers bright yellow, opening usually between six and seven in the evening, whence this plant is also called evening or night primrose. The uppermost flowers appear first in June, the stalk still advancing in height; there is a constant succession of flowers till late in the autumn.

2. O. longiflora. Long-flowered tree primrose. Leaves denticulate, and together with the germ and calyx hairy; flowers yellow, uncommonly large and showy, continuing from July to October.

3. O. mollissima Soft-tree primrose. Leaves lanceolate, soft, downy, undulate; stem branched: flowers at first pale yellow, but as they decay, changing to an orange hue, smaller than the preceding; and continuing from June to October.

4. O. fruticosa. Shrubby-tree primrose. Perennial, but herbaceous, notwithstanding its specific name; flowers large and showy, opening in the evening and continuing through the ensuing day. The flowers-buds, germs and stalks possess a richness of colour which renders this plant peculiarly ornamental.

5. O. pumila. Dwarf-tree primrose. Perennial, fibrous root; slender stalk, near a foot high; leaves smaller, sessile, light green terminating in blue points; flowers small, bright yellow; opening both in the morning and evening. All these plants are hardy, and with a little care will thrive in any soil or situation in our own country.

ŒNOTRI, the inhabitants of

ŒNOTRIA, a part of Italy, which was afterwards called Lucania. It received this name from Œnotrus, the son of Lycaon, who settled there with a colony of Arcadians. The name of Œnotria is sometimes applied to Italy.

O'ER, contracted from over.

OESEL, an island in the Baltic, on the coast of Livonia, at the entrance of the gulf of Riga. It is 74 miles long and 50 broad, defended by two forts, and belongs to Russia. Arensburg is the capital.

OESOPHAGUS. (from οιω, to carry, and φαγω, to eat, because it carries the food into the stomach.) The membranous and muscular tube that descends in the neck from the pharynx to the stomach. It is composed of three tunics or membranes, a common, muscular and mucous. Its arteries are branches of the œsophageal, which arise from the aorta. The veins empty themselves into the vena azygos. Its nerves are from the eighth pair and great intercostal; and it is every where under the internal or mucous membrane, supplied with glands that separate the mucous of the œsophagus, in order that the masticated bile may readily pass down into the stomach.

ŒSTRUM VENEREUM. (from *œstrus*, a gad-bee, because by its bite or sting it agitates cattle). The venereal orgasm, or pleasant sensation experienced during coition.

OESTRUS. Gadfly. Breeze. In zoology, a genus of the class insecta, order diptera. Mouth with a simple aperture and not exserted; feelers two, of two articulations, orbicular at the tip, and seated on each side in a depression of the mouth; antennas of three articulations, the last subglobular, and furnished with a bristle on the forepart; placed in two hollows on the front.

The face of this singular genus is broad, depressed, vesicular and glaucous, and has some sort of resemblance to the ape kind. They are extremely troublesome to horses, sheep, and black cattle, depositing their eggs in different parts of the body, and producing painful tumours and sometimes death. The larves are without feet, short, thick, soft and annulate; and often furnished with small hooks. There are twelve species, as follow:

1. O. bovis. Ox-gadfly. Wings immaculate, brown; abdomen with a black band in the middle, and orange-yellow hairs at the tip; front white, covered with down; thorax yellowish before, the middle black, with four short naked lines, behind cinereous; scales of the poisers large, snowy, convex; legs black with pale tarsi. Female with a black style at the end of the abdomen. Larve brown, of eleven segments, with transverse, rough, interrupted lines.

Deposits its eggs in the back of cattle, under the skin, which as the eggs are changed into larves produce a purulent tumour. By the pain it inflicts, an extreme terror and agitation are occasioned, and the object of the attack runs bellowing wildly about, with its tail erect and in a tremulous motion, and communicates its agitation to the whole herd.

2. O. equi. Horse-gadfly. Wings whitish, with a black band in the middle, and two dots at the tip: front white downy, crown brown; eyes black, distant; thorax brown, dusky in the middle; scutel with two hairy tufts. Female; browner, with a long, incurved, black

appendage at the end of the abdomen. Larve; round, pale, green; the tail obtusely truncate; head tapering, the mouth horny, with two lips, and two recurved black claws on each side of the mouth; segments of the body fringed with two rows of rigid spines turned downward.

There is another variety with a single oblong black spot at the tip; abdomen covered with thick brown ferruginous hairs; the œstrus vituli of Fabricius.

The female of this species deposits its eggs on the hairs of horses, and always on those parts which are most liable to be licked with the tongue; these either in the egg or larve state are conveyed by the tongue, after being licked off from the parts in which they are deposited, into the stomach, and passing through the intestines, are discharged with the dung. The larves thus evacuated are called bots, or bot-worms. Mr. Bracy Clark in an excellent paper upon this curious insect, inserted in vol. iii. of the Transactions of the Linnéan Society, observes that he has once seen the larve of this œstrus in the stomach of an ass; and that there is little reason to doubt their existence in the stomachs of all the equus tribe. The larves, when once introduced, attach themselves to every part of the stomach; but are generally most numerous about the pylorus, and less frequent in the intestines. Their numbers in the stomach are very various, often not more than half a dozen, at other times more than a hundred, and, according to some accounts, much more numerous still. They hang most commonly in clusters, being fixed by the small end to the inner membrane of the stomach, which they adhere to by means of two small hooks or tentacles. When they are removed from the stomach they will attach themselves to loose membrane, and even to the skin of the hand. They attain their full growth about the latter end of May, and are dropped by the horse from this time to the latter end of June, and sometimes later. On falling to the ground they find out some convenient retreat, and change to the chrysalis; after which, in about six or seven weeks, the fly appears.

3. O. hæmorrhoidalis. Smaller horse-gadfly. Wings immaculate, brownish; abdomen black, the base white and fulvous at the tip. About half the size of the preceding; the larve less, but exactly resembling that of O. equi. Deposits its eggs on the lips of horses, occasioning a titillation which causes the animal, when attacked by it, to move its head violently, and gallop about, with every appearance of distress. The larves are conveyed through the intestines, like those of the last species.

4. O. veterinus. Cattle-gadfly. Wings immaculate; body ferruginous; sides of the thorax and base of the abdomen with white hairs. Less than O. equi, and the same as O. nasalis of Gmelin, and O. equi of Fabricius. Deposits its eggs on horses and oxen; the larves probably pass through the stomach and form bots as in the preceding species.

5. O. ovis. Sheep-gadfly. Wings pellucid; punctured at the base; abdomen variegated with white and black; head with hollow dots on the crown; thorax cinereous, with black raised dots and four black lines; above the aperture of the mouth is a small conic process. Larve white, ovate, pointed before with two hooks, truncated behind with a prominent margin, and two black respiratory scales, above convex, with black lines and dots, beneath flat, with minute rough black dots in the middle of the segments. Deposits its eggs on the inner margin of the nostrils of sheep, occasioning them to shake their heads violently and hide their noses in dust or gravel. The larves crawl up into the frontal sinuses or horns, and when full fed are again discharged through the nostrils.

6. O. cuniculi. Rabbit-gadfly. Black; wings brown; thorax black as far as the middle; behind, and base of the abdomen, with yellowish hairs. Inhabits Georgia: twice as large as the horse-gadfly: deposits its eggs in the skins of hares and rabbits. Larve brown; every where rough with minute prickles.

7. O. buccatus. Grey; face white, dotted with black. Inhabits Carolina; a large insect.

8. O. tarandi. Wings immaculate; thorax yellow with a black band; abdomen fulvous, tipt with black. Inhabits Lapland. Deposits its eggs on the back of the rein-deer, and is often fatal to it.

9. O. trompe. Wings white; body black with cinereous hairs; thorax with a deep black band. Inhabits Lapland, on the rein-deer.

10. O. antilopæ. Wings with a brown band and dots; body hairy, tawny-grey; abdomen with three rows of blackish spots. Inhabits Asia; and deposits its eggs on the back of the antelope.

11. O. fasciculosus. Downy, yellow; tail with three tufts of blackish hairs. Inhabits Siberia.

12. O. hominis. Human-gadfly. Body entirely brown. Inhabits South America; and deposits its eggs under the skin, on the bellies of the natives. The larve, if it be disturbed, penetrates deeper, and produces an ulcer which frequently becomes fatal. See NATURAL HISTORY, Pl. CLX.

ŒTA, a celebrated mountain between Thessaly and Macedonia, upon which Hercules burnt himself. Its height has given occasion to the poets to feign that the sun, moon, and stars rose behind it. The streights of mount Œta are called Thermopylæ, from the hot baths in the neighbourhood. These passes are not more than 25 feet in breadth. (*Apollod. Paus.*) &c.—2. A small town at the foot of mount Œta, near Thermopylæ.

OETTINGEN, a town of Suabia, capital of a county of the same name, with a well-endowed college. It is seated on the Wirnitz, 12 miles N.N.W. of Donawert, and 28 south of Anspach. Lon. 10. 40 E. Lat. 48. 56 N.

OF, *prep.* (of, Saxon.) 1. It is put before the substantive that follows another in construction: as, of *these part were slain.* 2. It

is put among superlative adjectives: as, *the most dismal and unseasonable time* of *all other*. 3. From (*Shakspeare*). 4. Concerning; relating to (*Smalridge*) 5. Out of (*Dryden*). 6. Among (*Swift*). 7. By: not in use (*Sandys*). 1. According to (*Tillotson*). 9. Noting power, choice, or spontaneity: as, of *himself man is confessedly unequal to his duty*. 10. Noting properties, or condition: as, *a man* of *a decayed fortune*; *a body* of *no colour*. 11. Noting extraction: as, *a man* of *an ancient family*. 12. Noting adherence, or belonging: as, *a Hebrew* of *my tribe*. 13. Noting the matter of any thing: as, *the chariot was* of *cedar*. 14. Noting the motive: as, of *my own choice I undertook this work*. 15. Noting preference, or postporence: as, *I do not like the Tower* of *any place*. 16. Noting change of one state to another: as, *O miserable* of *happy!* 17. Noting causality: as, *good-humour* of *necessity will give allowance*. 18. Noting proportion: as, *many* of *a hundred*. 19. Noting kind or species: as, *an affair* of *the cabinet*. 20. It is put before an indefinite expression of time: as, *of* late, in late times.

OFF. *ad.* (*af*, Dutch.) 1. Of this adverb the chief use is to conjoin it with verbs: as, *to come* off; *to fly* off. 2. It is generally opposed to *on*: as, *to lay* on; *to take* off. 3. It signifies distance: as, *ten miles* off. 4. In painting or statuary, it signifies projection or relief: as, *the figures stand* off. 5. It signifies evanescence; absence or departure: as, *the scent goes* off. 6. It signifies any kind of disappointment; defeat; interruption: as, *the affair is* off. 7. From; not toward (*Sidney*). 8. *Off* hand; not studied (*L'Estrange*).

Off. *interject.* An expression of abhorrence, or command to depart (*Smith*).

Off. *prep.* 1. Not on (*Temple*). 2. Distant from (*Addison*).

OFFA, king of Mercia, 755, was successful against the kings of Kent and Wessex, and perfidiously murdered Ethelbert, king of the East Angles, and seized his kingdom. His crimes induced him to pay his court to the clergy for forgiveness. He not only made a pilgrimage to Rome, but was the first who gave the tenth of his goods to the church, and established the Peter-pence tribute. He founded the monastery of St. Alban's, and died 794.

Offa's dike, an entrenchment of England, cast up by Offa, a Saxon king, to defend England from the incursions of the Welsh. It extends through Herefordshire, Shropshire, Montgomeryshire, Denbighshire, and Flintshire, from the Wye to the Dee.

O'FFAL. *s.* (*off fall. Skinner.*) 1. Waste meat; that which is not eaten at the table (*Arbuthnot*). 2. Carrion; coarse flesh (*Milton*). 3. Refuse; that which is thrown away as of no value (*South*). 4. Any thing of no esteem (*Shakspeare*).

OFFANTO, a river of Naples, which rises in the Apennines, passes by Conza and Monte Verde, separates Capitanata from Basilicata and Terra di Barri, and enters the gulf of Venice, near Barletta. It is the ancient Aufidus.

OFFEN. See Buda.

OFFENBACH, a town of Franconia, taken by the French in 1796. It is seated on the Maine, five miles east of Francfort. Lon. 8. 45 E. Lat. 49. 52 N.

OFFENBURG, an imperial town of Suabia, under the protection of the house of Austria; seated on the Kintzig, 10 miles south-west of Strasburgh, and 20 S.S.W. of Baden. Lon. 8. 1 E. Lat. 48. 31 N.

OFFE'NCE. *s.* (*offence*, Fr. *offensa*, Lat.) 1. Crime; act of wickedness (*Fairfax*). 2. A transgression (*Locke*). 3. Injury (*Dryden*). 4. Displeasure given; cause of disgust; scandal (*Bacon*). 5. Anger; displeasure conceived (*Sydney*). 6. Attack; act of the assailant: contrary to *defence* (*Sidney*).

OFFE'NCEFUL. *a.* (*offence* and *full.*) Injurious; giving displeasure (*Shakspeare*).

OFFE'NCELESS. *a.* (from *offence.*) Unoffending; innocent (*Shakspeare*).

To OFFE'ND. *v. a.* (*offendo*, Lat.) 1. To make angry; to displease (*Knolles*). 2. To assail; to attack (*Sidney*). 3. To transgress; to violate. 4. To injure (*Dryden*).

To Offe'nd. *v. n.* 1. To be criminal; to transgress the law. 2. To cause anger (*Shakspeare*). 3. To commit transgression (*Swift*).

OFFE'NDER. *s.* (from *offend*). 1. A criminal; one who has committed a crime; a transgressor (*Isaiah*). 2. One who has done an injury (*Shakspeare*).

OFFE'NDRESS. *s.* (from *offender.*) A woman that offends (*Shakspeare*).

OFFE'NSIVE. *a.* (*offensif*, Fr. from *offensus*, Latin.) 1. Causing anger; displeasing; disgusting (*Spenser*). 2. Causing pain; injurious (*Bacon*). 3. Assailant; not defensive (*Bacon*).

OFFE'NSIVELY. *ad.* 1. Mischievously; injuriously (*Hooker*). 2. So as to cause uneasiness or displeasure. 3. By way of attack; not defensively.

OFFE'NSIVENESS. *s.* (from *offensive.*) 1. Injuriousness; mischief. 2. Cause of disgust (*Grew*).

To O'FFER. *v. a.* (*offero*, Lat. *offrir*, Fr.) 1. To present; to exhibit any thing so that it may be taken or received (*Locke*). 2. To sacrifice; to immolate (*Dryden*). 3. To bid, as a price or reward (*Dryden*). 4. To attempt; to commence (*Maccabees*). 5. To propose (*Locke*).

To O'ffer. *v. n.* 1. To be present; to be at hand; to present itself (*Sidney*). 2. To make an attempt (*Bacon*).

O'ffer. *s.* (*offer*, French, from the verb.) 1. Proposal of advantage to another (*Pope*). 2. First advance (*Shakspeare*). 3. Proposal made (*Daniel*). 4. Price bid; act of bidding a price (*Swift*). 5. Attempt; endeavour (*South*). 6. Something given by way of acknowledgment (*Sidney*).

O'FFERER. *s.* (from *offer.*) 1. One who makes an offer (*Chapman*). 2. One who sacrifices, or dedicates in worship (*South*).

O'FFERING. *s.* (from *offer*). A sacrifice; any thing immolated, or offered in worship.

The Hebrews had several kinds of offerings, which they presented at the temple. Some were free-will offerings, and others were of obligation; the first-fruits, the tenths, the sin-offerings, were of obligation; the peace-offerings, vows, offerings of wine, oil, bread, salt, and other things, which were made to the temple or to the ministers of the Lord, were offerings of devotion. The Hebrews called all offerings in general *corban*. But the offerings of bread, salt, fruits, and liquors, as wine and oil, which were presented to the temple, they called *mincha*. The sacrifices are not properly offerings, and are not commonly included under that name. See CORBAN and SACRIFICE.

The offerings of grain, meal, bread, cakes, fruits, wine, salt, and oil, were common in the temple. Sometimes these offerings were alone, and sometimes they accompanied the sacrifices. Honey was never offered with the sacrifices; but it might be offered alone in the quality of first fruits. Now these were the rules that were observed in the presenting of those offerings, called in Hebrew *mincha* or *kerbon mincha*; in the Septuagint, offerings of sacrifice; and the same by St. Jerom, *oblationem sacrificii*; but by our translators, meat-offerings. (Lev. ii. 1. &c.) There were five sorts of these offerings: 1. Fine flour or meal. 2. Cakes of several sorts, baked in an oven. 3. Cakes baked upon a plate. 4. Another sort of cakes, baked upon a gridiron, or plate with holes in it. 5. The first-fruits of the new corn, which were offered either pure and without mixture, or roasted or parched in the ear, or out of the ear.

OFFERTORY *s.* (*offertoire*, Fr.) The act of offering (*Bacon*).

OFFE'RTURE. *s.* (from *offer.*) Offer; proposal of kindness: not in use (*King Charles*).

O'FFICE. *s.* (*office*, Fr. *officium*, Latin.) 1. A public charge or employment; magistracy (*Shakspeare*). 2. Agency; peculiar use (*Newton*). 3. Business; particular employment (*Milton*). 4. Act of good or ill voluntarily tendered (*Shakspeare*). 5. Act of worship (*Shakspeare*). 6. Formulary of devotions (*Taylor*). 7. Room in a house appropriated to particular business (*Shakspeare*). 8. (*officina*, Latin.) Place where business is transacted (*Baron*).

To O'FFICE. *v. a.* (from the noun.) To perform; to discharge; to do (*Shakspeare*).

O'FFICER. *s.* (*officier*, French). 1. A man employed by the public (*Shakspeare*). 2. A commander in the army, or navy. 3. One who has the power of apprehending criminals (*Shakspeare*).

The great officers of the crown, or state, are, the lord high-steward, the lord high-chancellor, the lord high-treasurer, the lord-president of the council, the lord privy-seal, the lord-chamberlain, the lord high-constable, and the earl marshal; each of which see under its proper article.

OFFICERS (Non-commissioned), are serjeant-majors, quartermaster-serjeants, serjeants, corporals, drum and fife-majors; who are nominated by their respective captains, and appointed by the commanding officers of regiments, and by them reduced without a court-martial.

OFFICERS (Orderly non-commissioned), are those who are orderly, or on duty for that week; who, on hearing the drum beat for orders, are to repair to the place appointed to receive them, and to take down in writing, in the orderly-book, what is dictated by the adjutant, or serjeant-major: they are then immediately to show these orders to the officers of the company, and afterwards warn the men for duty.

OFFICERS (Flag). See FLAG OFFICERS and ADMIRALS.

OFFICERS (Commission), are such as are appointed by the king's commission. Such are all from the general to the cornet and ensign inclusive. They are thus called in contradistinction to non-commissioned officers. See NON COMMISSIONED OFFICERS.

OFFICERS (General), are those whose command is not limited to a single company, troop, or regiment; but extends to a body of forces composed of several regiments: such are the general, lieutenant-general, major-general, and brigadier.

OFFICERS (Staff), are such as, in the king's presence, bear a white staff or wand; and at other times, on their going abroad, have it carried before them by a footman bare-headed: such are the lord-steward, lord-chamberlain, lord-treasurer, &c. The white staff is taken for a commission; and, at the king's death, each of these officers breaks his staff over the hearse made for the king's body, and by this means lays down his commission, and discharges all his inferior officers.

OFFICERS (Subaltern), are all who administer justice in the name of subjects; as those who act under the earl-marshal, admiral, &c. In the army, the subaltern officers are the lieutenants, cornets, ensigns, serjeants, and corporals.

O'FFICERED. *a.* (from *officer.*) Commanded; supplied with commanders (*Addi.*).

OFFI'CIAL. *a.* (*official*, Fr. from *office.*) 1. Conducive; appropriate with regard to their use (*Brown*). 2. Pertaining to a public charge (*Shakspeare*).

OFFICIAL, in the canon law, an ecclesiastical judge, appointed by a bishop, chapter, abbot, &c. with charge of the spiritual jurisdiction of the diocese.

OFFICIAL is also a deputy appointed by an archdeacon as his assistant, who sits as judge in the archdeacon's court.

OFFI'CIALTY. *s.* (*officialité*, Fr.) The charge or post of an official (*Ayliffe*).

To OFFI'CIATE. *v. a.* (from *office.*) To give, in consequence of office (*Milton*).

To OFFI'CIATE. *v. n.* 1. To discharge an office, commonly in worship (*Sanderson*). 2. To perform an office for another.

OFFICI'NAL. *a.* (from *officina*, a shop.) Used in a shop, or belonging to it: thus *officinal* plants and drugs are those used in the shops.

OFFI'CIOUS. *a.* (*officiosus*, Latin.) 1.

Kind; doing good offices (*Milton*). 2. Importunely forward (*Shakspeare*).

OFFI'CIOUSLY. *ad.* (from *officious*). 1. Importunately forward (*Dryden*). 2. Kindly; with unasked kindness (*Dryden*).

OFFI'CIOUSNESS. *s.* (from *officious*.) 1. Forwardness of civility, or respect, or endeavour (*South*). 2. Service (*Brown*).

OFFIDA, a town of Italy, in the marquisate of Ancona, 26 miles south of Loretto. Lon. 13. 46 E. Lat. 42. 53 N.

OFFING, or OFFIN, in the sea-language, that part of the sea, a good distance from shore, where there is deep water, and no need of a pilot to conduct the ship: thus, if a ship from shore be seen sailing out to seaward, they say, she stands for the offing; and if a ship, having the shore near her, have another a good way without her, or towards the sea, they say, that ship is in the offing.

OFFSCOU'RING. *s.* (*off* and *scour*.) Recrement; part rubbed away in cleaning any thing (*Kettlewell*).

OFF-SETS, in gardening, are the young shoots that spring from the roots of plants; which being carefully separated, and planted in a proper soil, serve to propagate the species.

OFF-SETS, in surveying, are perpendiculars let fall, and measuring from the stationary lines to the hedge, fence, or extremity of an inclosure.

O'FFSPRING. *s.* (*off* and *spring*.) 1. Propagation; generation (*Hooker*). 2. The thing propagated or generated; children; descendants (*Davies*). 3. Production of any kind (*Denh*)

To OFFU'SCATE. *v. a.* (*offusco*, Latin.) To dim; to cloud; to darken.

OFFUSCA'TION. *s.* (from *offuscate*.) The act of darkening.

OFT. *ad.* (oft, Saxon.) Often; frequently; not rarely; not seldom (*Hammond*).

O'FTEN. *ad.* (from oft, Saxon.) Oft; frequently; many times (*Addison*).

OFTENTI'MES. *ad.* (*often* and *times*.) Frequently; many times; often (*Hooker*).

OFTTI'MES. *ad.* (*oft* and *times*.) Frequently; often (*Dryden*).

OGDEN (Samuel), an English divine, born at Manchester 1716, and educated at the grammar-school there, and at King's college, Cambridge, and St. John's. In 1744 he was elected master of Halifax school, which he resigned 1753 to reside at Cambridge. In 1764 he was made Woodwardian professor, and in 1766 presented to the rectory of Lawford, Essex, and a month after to Stansfield, Suffolk. He died 1778. It is said that his manners were rustic, but his heart was most amiable. His sermons have been published in 2 vols. 8vo. and defended by bishop Halifax against Mainwaring. They are popular, sententious discourses, in which sound morality is inculcated, but is seldom enforced upon the peculiar evangelical motives.

OGEE, or O. G. In architecture, a moulding consisting of two members, the one concave and the other convex; or of a round and hollow, like an S. See ARCHITECTURE.

OGGERSHEIM, a town of Germany, in the palatinate of the Rhine, with a villa belonging to the elector. It is situate on the Rhine, four miles W.N.W. of Manheim.

OGHAMS, a particular kind of steganography, or writing in cypher, practised by the Irish; of which there were three kinds. The first was composed of certain lines and marks, which derived their power from their situation and position, as they stand in relation to one principal line, over or under which they are placed, or through which they are drawn: the principal line is horizontal, and serveth for a rule or guide, whose upper part is called the left, and the under side the right; above, under, and through which line, the characters or marks are drawn, which stand in the place of vowels, consonants, diphthongs, and triphthongs.

OGIVE. See OGEE.

To O'GLE. *v. a.* (*oogh*, an eye, Dutch.) To view with side glances, as in fondness, or with a design not to be heeded (*Dryden*).

O'GLER. *s.* (*oogheler*, Dutch.) A sly gazer; one who views by side glances (*Arbuthnot*).

O'GLIO. *s.* (from *olla*, Spanish.) A dish made by mingling different kinds of meat; a medley; a hotchpotch (*Suckling*).

OGYGES, the most ancient monarch that reigned in Greece. He was son of Terra, or, as some suppose, of Neptune. He reigned in Bœotia, which, from him, is sometimes called Ogygia, and his power was also extended over Attica. In the reign of Ogyges there was a deluge, which so inundated the territories of Attica, that they remained waste for near 200 years. This, though it is very uncertain, is supposed to have happened about 1764 years before the Christian era, previous to the deluge of Deucalion.

OGYGIA, an ancient name of Bœotia, from Ogyges, who reigned there. The island of Calypso, opposite to the promontory of Lacinium, in Magna Græcia, where Ulysses was shipwrecked. The situation, and even the existence of Calypso's island, is disputed.

OH! An interjection or exclamation denoting pain or sorrow; while O without the *h* is employed to denote surprise, or any gratification.

OHETEROA, an island in the South Pacific Ocean, 13 miles in circuit. It has no harbour, and is neither so populous nor fertile as the islands to the north of it; yet its manufactures are of a superior kind. The cloth is of a better die, and the spears and clubs are better carved and polished. The people are lusty and well made, and rather browner than those of the Society Islands. Lon. 150. 47 W. Lat. 22. 27 S.

OHIO, a river of North America, which has its source in the Allegany mountains, and is called the Allegany, till its junction with the Monongahela at Fort Pitt, when it first receives the name of Ohio. It bounds the state of Kentucky in its whole length; and the only disadvantage it has is a rapid, one mile and a half long, in lat. 38. 3 N. about 400 miles

from its mouth. In this place the river runs over a rocky bottom, above 1000 yards broad, and the descent is so gradual, that the fall does not probably in the whole exceed ten feet. When the stream is low, empty boats only can pass this rapid; but, when high, boats of any burden may pass in safety. The Ohio carries a great uniformity of breadth, from 400 to 600 yards, except the last 150 miles, where it is from 800 to 1000 yards. After a course of near 1200 miles, from Pittsburg, in which it receives numbers of large and small rivers, it enters the Mississippi in lat. 36. 43 N.

OHLAU, a town of Silesia, in the principality of Brieg, with a large castle. Great quantities of tobacco are produced in the neighbourhood. It is situate on the Ohla, eight miles N.W. of Brieg, and 14 S.E. of Breslaw. Lon. 17. 29 E. Lat. 50. 56. N.

OHRDRUF, a town of Upper Saxony, in the principality of Gotha. It has several times been destroyed by fire, but is now in a very flourishing state, from its numerous manufactures. It is eight miles S.S.E. of Gotha, and 15 S.W. of Erfurt. Lon. 10. 57 E. Lat. 50. 55 N.

OHRINGEN, a town of Franconia, 34 miles E.S.E. of Heidelberg, and 33 S. of Wertheim. Lon. 9. 50 E. Lat. 49. 13 N.

OIGH (Loch), a lake in Invernesshire, extending four miles from E. to W. It contains some little wooded islands; and its waters flow through Loch Ness into Murray Frith.

OIL. (ἔλαιον, from *olea*, the olive, this name being at first confined to the oil expressed from the olive; *huile*, Fr. *oele*, Germ.) Oils are defined, by modern chemists, to be proper juices of a fat or unctuous nature, either solid or fluid, indissoluble in water, combustible with flame, and volatile in different degrees. They are never formed but by organic bodies; and all substances in the mineral kingdom which present oily characters have originated from the action of vegetable or animal life.

Oil, then, is a term that comprises a great multitude of unctuous liquids, which, when dropt upon paper, sink into it, and make it semitransparent; or, in common language, give it a greasy stain. Many of these have been known from a very remote period, and especially those which are appropriated to burning in lamps, since we know that lamps furnished with this material were in use as far back as the epoch of Abraham. The olive-plant was very early cultivated, and oil extracted from it in Egypt. Cecrops introduced it into Greece from Sais, a town of Lower Egypt, where it had been cultivated immemorially, and taught the Athenians the manner of obtaining its oil: and from Greece the use of olive oil has progressively spread over all Europe.

It is, however, a singular circumstance, that Homer makes no mention of the use of lamps, and constantly describes his heroes as lighted by torches of wood: from which circumstance we may safely collect that the Greeks did not appropriate oil to this purpose, till a period subsequent to the Trojan war.

In the comprehensive sense in which the term is employed in modern chemistry, it has been necessary to arrange the substances which it comprises under different heads. The more usual division is into two kinds, fixed or expressed, and volatile, or essential; and it is under this division they are treated by Dr Thomson. It is a division, however, which does not conveniently embrace every material which is entitled to the name of an oil, and is generally thus distinguished; and we shall hence rather adopt the classification of Messrs. Aikin and take a view of them under the heads of Vegetable Unctuous Oils; Vegetable Essential Oils; Vegetable Empyreumatic Oils; and Animal Oils.

1. UNCTUOUS VEGETABLE OILS* comprehend those which are usually known under the name of fixed, expressed, or heavy oils; though a few belonging to this class are not obtained by expression. They are met with for the most part in the cotyledons of certain seeds, and occasionally, though rarely, in the pulp or flesh of fruits. In the former the oil is always mixed with a greater or smaller proportion of fecula and mucilage; on which account these seeds, when rubbed in a mortar with cold water, form with it a white, opaque, milk-like fluid, called an emulsion: from which, by long standing (or more speedily by the addition of an acid), the oil separates and rises to the surface in the form of thick cream.

There are two ways of extracting oils of this character: the first and most usual is by means of pressure; the second is by immersion in hot water; in which latter case, the oil separating from the other ingredients and rising to the surface of the water, is skimmed off.

Recently drawn oil is more or less impure on account of its containing a variable proportion of mucilage, fecula, and perhaps other substances: of these a part is always deposited by rest, especially if the contact of the air be not entirely excluded; but another portion remains in permanent solution, and to this that partial decomposition in oils called rancidity is principally owing.

Fixed oil at the common atmospheric temperature is usually in the state of a moderately fixed, thick, but not, properly speaking, viscid fluid; to the touch it is remarkably smooth and unctuous; it has a mild subnauseous taste, and a peculiar flavour according to the vegetable from which it is produced. Its colour, when recent, has more or less of a greenish tinge, which by keeping becomes yellow, and in some instances orange-coloured, verging on red. There is nothing, however, in which these oils differ from each other so much as in the temperature at which they congeal: some continuing solid at the highest atmospherical temperature, as palm-oil, and the rest of the vegetable butters (as they are called from this circumstance), while others, in order to be solidified, require cooling down to the freezing point of water, and a third sort are capable of enduring a still greater degree of cold with solidification.

Water seems to be incapable of combining with fixed oil in any proportion. If the two fluids are strongly shaken together in a half-filled phial, the oil is broken into very minute globules, and thus gives the water the appearance of thin milk or whey; but after standing for a few seconds, the whole of the oil rises to the surface, and the two liquors remain as clear and distinct as at first. That a considerable attraction, however, subsists between the water and the oil, is manifest from the well-known fact that if a drop of oil be let fall into a bason of water, it does not retain its globular form; but immediately spreads itself into a thin iridescent film with which the whole surface of the water is covered.

* These oils are denominated fixed because they

are incapable of being volatilized by heat without decomposition; and hence when any of them, as olive oil for example, is heated in a close distillatory apparatus, as soon as the fluid has arrived at its boiling point, a white vapour is disengaged, consisting of oil, carburetted hydrogen, and carbonic acid; of these the first is for the most part condensed in the receiver, while the other two, holding a portion of oil in solution, escape in the form of permanent gass; when every thing volatile has been driven off, nothing remains in the retort but a little charcoal. The oil which is found in the receiver is lighter, more limpid and volatile than that from which it was procured, and these qualities are observed to increase by each successive distillation, carbon, and carburetted hydrogen being disengaged as at first. By treating in this manner the product of each distillation, the oil at length entirely disappears, being partly decomposed, and partly carried off in solution by the carburetted hydrogen gass.

If oil, instead of being distilled, be heated in an open kettle, its colour will by degrees become deeper, a highly inflammable and fetid vapour escape, and the remaining oil be found thick and viscid, and when spread over wood or any other substance, and exposed to the air, will congeal into a solid, tough, transparent varnish. In this state it is called boiled or drying oil. It has not been very satisfactorily shown what takes place on this occasion, but it is probable that the mucilage and fecula are for the most part charred and decomposed, that the water with which they were combined is volatilized, that a small portion of the oil itself is driven off, and that the residue has absorbed some oxygen from the air. When oil is exposed to a high heat, and at the same time to the free contact of the atmosphere, it takes fire, and burns with a copious flame, accompanied by a thick black smoke; the combustion of oil, however, does not readily take place, except by means of a wick. If an Argand lamp be used for this purpose the flame is of a pure white colour, and no smoke is produced, the whole of the oil undergoing entire combustion. In this process, according to Lavoisier, the oil is converted into water and carbonic acid, in such proportions that its constituent parts may be stated as 21 of hydrogen, and 79 of carbon.

The principal fixed oils are as follows:

Olive oil	Mustard, cole, rape and sun-flower oil
Cornel oil	
Almond oil	Nut oil
Poppy-seed or pink oil	Beech-nut oil
Linseed oil	Ben oil
Hempseed oil	Cacao oil
	Palm oil.

Olive oil.—The fruit of the olive tree (oliva Europea) when ripe, is of a dark purple colour, and both in size and shape resembles a long plum. It consists of a nut or stone, covered with a fleshy pulp, in the latter of which are the cells that contain the oil; the interior nut also contains an oil, but of a bitter disagreeable taste. The fruit, as soon as gathered, is broken in a mill, care being taken to set the mill-stones at such a distance as to avoid crushing the nut of the olive. The pulp thus prepared is put into bags made of rushes, and subjected to a moderate pressure, by which a considerable quantity of a greenish, semi-transparent oil is obtained; which, from its superior excellence, is called virgin oil. The marc, or refuse, remaining after this first operation, is broken to pieces, moistened with a little warm water, and again returned to the press; a mixture of oil and water flows out, which soon separates spontaneously by rest. This oil, though inferior to the former, is still of a very good quality, and fit for the table. The marc being again broken into pieces, drenched with water, and fermented in large cisterns, is for the third and last time submitted to the full force of the press, by which a considerable quantity of oil is obtained very valuable to the soap-boiler and other manufacturers. In Spain and some other countries the olives, instead of being carefully gathered by the hand and selected, are beaten down and used in a mass, the sound with the unsound; a large heap being made of the whole, which as soon as it begins to ferment is ground and strongly pressed as above. A larger quantity of oil is hence obtained, and with less trouble, but of a rank, disagreeable flavour; intolerable, indeed, to any but those who have been accustomed to it from their childhood. In the countries that produce this oil, the superior kinds are employed as butter is among ourselves; the inferior are burnt in lamps, or made into soaps, for the most part of a finer quality than those that are composed of animal oils.

Cornel oil.—This is the only oil which is produced like olive oil from the pulpy fruit of the vegetable rather than from the seeds. Treated after the manner of olives, the berries of about 22lb. avoirdupois of this shrub, the cornus sanguinea of Linnéus, will produce something more than 4 pints of a fat and somewhat viscid oil, of a bright green colour, and altogether as destitute of an unpleasant flavour as the best olive oil.

Almond oil.—This is procured either from the sweet or the bitter almond. The almonds are first put into a coarse hempen or hair sack, and shaken violently in order to detach, by rubbing against each other and the sides of the sack, the outer brown skin; which if retained, is apt to give a bitter taste to the oil: they are then bruised, and made into a paste, and pressed in the usual manner. One hundred pounds of almonds afford by the first expression 25lb. of oil; and from the marc, when impregnated with the steam of hot water, may be procured 15lb. more of an inferior kind. Almond oil when fresh is of a light greenish yellow colour, and somewhat turbid, but by time it becomes clear and colourless: it is slightly sweetish to the taste, and has little or no odour. The degree at which it congeals is variously stated at 19° and 8° Fahrenheit: the former probably relates to the fresh-drawn oil. The only difference between the oil from sweet and that from bitter almonds is, that the latter may be kept the longest without growing rancid. On account of its high price in Europe, it is mostly restricted to medical purposes.

Poppy-seed oil, or pink oil.—This is extracted by cold-drawing from the large white poppy, papaver somniferum of Linnéus; which is largely cultivated for this purpose in France, the Netherlands, and various parts of Germany. It is transparent and nearly colourless, and when well prepared has no other taste or flavour than a slight one of nut-kernels. It is one of the naturally drying oils, and, like all of that class, is frozen with difficulty: it may be cooled down to 0° of Fahrenheit without congealing.

Linseed oil.—The seeds of the common flax, from which this oil is produced, consist of a white kernel, covered by a thin brownish shell. As it is impossible to separate the shell from the kernel, the

entire seed must be submitted to the press, but if thus treated without any previous preparation, the quantity of oil obtained will be comparatively small, on account of a strong mucilage that resides in the shell, and absorbs a large proportion of the oil as it is forced out of the kernel; for this reason, and because the cold-drawn oil is not so fit for the purposes to which linseed oil is generally applied as that which is hot drawn, the following method is generally taken to destroy the mucilage before the application of the press: an iron vessel like a sand-bath, and capable of containing some bushels, is fixed in a furnace; it is then filled with linseed and heated by a moderate fire, care being taken to stir up its contents from time to time, that every part may be equally roasted; at first there arises an abundance of aqueous vapour, which, as the heat is increased, is followed by damp blackish fumes, of a very nauseous odour. The torrefaction being completed, the paste is pressed in the mill in the usual way.

Hempseed oil.—This is of a green colour, and peculiarly impregnated with the peculiar odour of the plant. It is obtained like the preceding.

Oils of mustard-seed, cole-seed, rape-seed, and sunflower seed.—These oils are less coloured and less highly flavoured than the two preceding; they are very little liable to dry by exposure to the air, which, together with their moderate price, induces a large consumption of them by the leather-dressers and wool-dressers, in order to preserve the wool from the attacks of moths and other insects.

Nut oil.—This is chiefly obtained by cold drawing from the kernels either of the walnut or the hazle-nut. In the warm climate of the south of Europe these fruits reach their full perfection, and will yield by proper management full half their weight of oil. When fresh it has an exquisite nut flavour, and is hence preferred to olive oil.

Beech-nut oil.—The beech mast of our own country from being less matured, and probably from inexpertness in those who have attended to them, has not hitherto been found capable of producing a sufficiency of oil to repay the trouble of working. But in France and Germany it is worked to good effect, the first produce of oil being 15 per cent. of clear light oil, and the second produce 12 per cent.

Oil of ben.—This is the oleum balani of the ancients, and is procured by expression from the decorticated seeds of the guilandia moringa, a tree that grows in Ceylon, Ethiopia, Egypt, and Arabia. One hundred pounds of the seeds yield 23lb. of a yellowish limpid oil, inodorous, insipid, and which does not become rancid by exposure to the air; on which account it is much used by the Italians as the basis of their perfumed oils, which are commonly prepared by filling a covered dish with alternate layers of cotton soaked in ben oil, and flowers of jasmine, violet, orange, &c. After the dish has been set in hot water or in the sun-shine for a few days, its contents are unpacked, and the oil squeezed out of the cotton, which by this simple process is found to be highly impregnated with the aromatic qualities of the flowers.

Butter of cacao. This is procured from the chocolate nut, the fruit of the theobroma cacao. The nuts are roasted till the outer husk is shelled off, and are then beaten into a smooth thin paste, and boiled in water; the oil which swims on the surface is the cacao butter, which is carefully skimmed, like a date stone, but abounding in oil. Of these the two principal are the cocos butyracea, and elycœis guineensis. The fruit when ripe is heated, and fermented; then coarsely pounded and macerated with hot water, when the oil will collect on the surface, which on cooling concretes into a solid cake of a light lemon yellow colour, with little or no taste, but a high odour and flavour like that of the Florentine iris.

Upon this general survey of the fixed oils, the following observations are worthy of attention:

1. Some of them when exposed to the action of the atmosphere, or of oxygen gass, dry altogether without losing their transparency; and hence receive the name of drying oils, and are employed as such by the painters.

2. Others under the same circumstances become gradually thick, opaque, and white, and assume an appearance very much resembling wax or tallow.

When oil is poured upon water so as to form a thin layer on its surface, and is in that manner exposed to the atmosphere, these changes are produced much sooner. Berthollet, who first examined these phenomena with attention, ascribed them to the action of light; but Sennebier observed that no such change was produced on the oil though ever so long exposed to the light, provided atmospherical air was excluded; but that it took place on the admission of oxygen gass, whether the oil was exposed to the light or not. It cannot be doubted, then, that it is owing to the action of oxygen. It is supposed at present to be the consequence of the simple absorption of oxygen and its combination with the oils.

3. Both these classes of oils, when exposed in considerable quantity to the action of the atmosphere, undergo another change, well known under the name of rancidity. But the fat oils become rancid much more readily than the drying oils. Rancid oils are thick, have usually a brown colour, convert vegetable blues to red, and have the smell and taste of sebacic acid. During the change which they undergo, some drops of water also appear on their surface. The rancidity of oils then is owing to the formation of a quantity of acid in them. This, together with the water, is evidently the consequence of a partial decomposition.

Fixed oils readily dissolve sulphur when assisted by heat. The solution assumes a reddish colour. When distilled, there comes over a great quantity of sulphureted hydrogen gass. When the solution is allowed to cool, the sulphur is deposited in crystals. By this process Pelletier obtained sulphur in regular octahedrons.

They likewise dissolve a small proportion of phosphorus when assisted by heat. These oily phosphurets emit the odour of phosphureted hydrogen, and yield, when distilled, a portion of that gass. When rubbed in the open air, or when spread upon the surface of other bodies, they appear luminous in consequence of the combustion of the phosphorus. When hot oils saturated with phosphorus are allowed to cool, the phosphorus crystallizes in octahedrons, as Pelletier ascertained.

Charcoal has no sensible action on fixed oils; but when they are filtred through charcoal-powder they are rendered purer, the charcoal retaining their impurities. Neither hydrogen nor azotic gass has any action on fixed oils.

Fixed oils have scarcely any action upon metals; but they combine with several metallic

oxides, and form compounds known by the name of plasters. See EMPLASTRUM.

They combine likewise with alkalies and earths, and form with them compounds called soaps. The fat oils enter into these combinations much more readily than the drying oils. See SOAP.

Fixed oils absorb nitrous gass in considerable quantities, and at the same time become much thicker and specifically heavier than before.

Sulphuric acid decomposes fixed oils, at least when concentrated It renders them first thick and of a brown colour; then water is formed, charcoal precipitated, and an acid formed. Nitric acid renders them thick and viscid. When nitrous acid is poured upon the drying oils, it inflames them without addition; but it does not produce that effect upon the fat oils, unless it is mixed with a portion of sulphuric acid

The affinities of fixed oils are as follows:

Lime,	Ammonia,
Barytes,	Oxide of mercury,
Fixed alkalies,	Other metallic oxides,
Magnesia,	Alumina.

The importance of fixed oils is well known. Some of them are employed as seasoners of food; some are burnt in lamps; some form the basis of soap; not to mention their utility in painting, and the many other important purposes which they serve.

OILS (Volatile), called also essential oils, are distinguished by the following properties:

1. Liquid; often almost as liquid as water; sometimes viscid.
2. Very combustible
3. An acrid taste and a strong fragrant odour.
4. Boiling point not higher than 212°.
5. Soluble in alcohol; and imperfectly in water.
6. Evaporate without leaving any stain on paper.

By this last test it is easy to discover whether they have been adulterated with any of the fixed oils. Let a drop of the volatile oil fall upon a sheet of writing-paper, and then apply a gentle heat to it. If it evaporates without leaving any stain upon the paper, the oil is pure; but if it leaves a stain, it has been contaminated with some fixed oil or other.

Volatile oils are almost all obtained from vegetables, and they exist in every part of plants; the root, the bark, the wood, the leaves, the flower, and even the fruit; though they are never found in the substance of the cotyledons; whereas the fixed oils, on the contrary, are almost always contained in these bodies.

When volatile oils are contained in great abundance in plants, they are sometimes obtained by simple expression. This is the case with the oil of oranges, of lemons, and of bergamot; but in general they can only be obtained by distillation. The part of the plant containing the oil is put into a still with a quantity of water, which is distilled off by the application of a moderate heat. The oil comes over along with the water, and swims upon its surface in the receiver. By this process are obtained the oils of peppermint, thyme, lavender, and a great many others, which are prepared and employed by the perfumer. Others are procured by the distillation of resinous bodies. This is the case in particular with oil of turpentine, which is obtained by distilling a kind of resinous juice, called turpentine, that exudes from the juniper.

The greater number of volatile oils are liquid, and some of them are transparent and colourless as water. This is the case with the oil of turpentine; but for the most part they are coloured. Some of them are yellow, as the oil of lavender; some brown, as the oil of rhodium; some blue, as the oil of camomile; but the greater number of volatile oils are yellow or reddish-brown.

Their odours are so various as, to defy all description. It is sufficient to say, that all the fragrance of the vegetable kingdom resides in the volatile oils. Their taste is always acrid, hot, and exceedingly unpleasant. Their specific gravity is for the most part less than that of water; but some volatile oils, as those of canella and sassafras, are heavier than water. The specific gravity of the volatile oils varies from 0.8697 to 1.0439.

Water dissolves a small portion of volatile oils, and acquires the odour and the taste of the oil which it holds in solution.

When heated, they evaporate very readily and without alteration. They are much more combustible than fixed oils, owing to their greater volatility. They burn with a fine bright white flame, exhale a great deal of smoke, deposit much soot, and consume a greater proportion of the oxygen of the atmosphere than fixed oils. The products of their combustion are water and carbonic acid gass. From these facts it has been concluded that they are composed of the same ingredients as the fixed oils, but that they contain a greater proportion of hydrogen.

When exposed to the action of cold they congeal like the fixed oils; but the temperature necessary to produce this effect varies according to the oil. Some of them, as oil of anise and of fennel, become solid at the temperature of 50°; frozen oil of bergamot and of canella become liquid at 23°; oil of turpentine at 14° Margueron exposed several volatile oils to a cold of 17°. They congealed or rather crystallized partially, and at the same time emitted an elastic fluid. These chrystals consisted partly of the oils themselves, partly of other substances. Some of them had the properties of benzoic acid.

Volatile oils, when exposed to the action of light in close vessels, and excluded from common air, undergo very singular changes. Their colour becomes deeper, they acquire a great deal of consistency, and their specific gravity is considerably increased. The cause of these changes is but imperfectly known. Tingry, to whom we are indebted for these interesting researches, has proved that light is a necessary agent. It was supposed formerly that they were occasioned by the absorption of oxygen; and when oxygen is present, it has been ascertained that it is absorbed: but Tingry has proved that the same changes go on when oxygen is excluded. This philosopher ascribes them to the fixation of light. If this is the real cause, the quantity of light fixed must be enormous; for as the specific gravity of the oils is increased considerably while the bulk continues the same, it is evident that the absolute weight must be increased proportionably. One circumstance, however, renders this conclusion somewhat doubtful, at least in its full extent; and that is, that the quantity of change was always proportional to the quantity of the oil and the quantity of air contained in the vessel.

When exposed to the open air their colour becomes gradually deeper, and they acquire con-

sistency, while they exhale at the same time a very strong odour. The air around, as Priestley first ascertained, is deprived of its oxygen, a quantity of water is formed, and the oils at last, for the most part, assume the form of resins.

Volatile oils dissolve sulphur and phosphorus, and the solutions have nearly the same properties as those made by means of fixed oils.

They have no action on the metals, and seem scarcely capable of combining with the metallic oxides.

They combine only imperfectly, and in small quantities, with alkalies and earths. The French chemists have proposed to give these combinations the name of savonules, which Dr. Pearson has translated by the term saponules; but these denominations have not been adopted by chemists.

They absorb nitrous gass in great abundance, and with great facility, and seemingly decompose it, acquiring a thick consistence and a resinous appearance, as if they had absorbed oxygen.

Sulphuric acid decomposes volatile oils; carbureted hydrogen gass is emitted, and charcoal is precipitated. Nitric acid inflames them, and converts them into water, carbonic acid, and charcoal. Oxymuriatic acid converts them into substances analogous to resins.

Volatile oils are applied to a great number of uses. Some of them are employed in medicine; some of them, as oil of turpentine, are much used to dissolve resins, which are afterwards employed as varnishes; not to mention their employment in painting and in perfumery.

The following is a list of the plants which yield the fixed oils occurring usually in commerce:

1. Linum usitatissimum & perenne	Linseed oil
2. Corylus avellana 3. Juglans regia	Nut oil
4. Papaver somniferum	Poppy oil
5. Cannabis sativa	Hemp oil
6. Sesamum orientale	Oil of sesamum
7. Olea Europea	Olive oil
8. Amygdalus communis	Almond oil
9. Guilandina Moliringa	Oil of behen
10. Cucurbita pepo & melapepo	Cucumber oil
11. Fagus sylvatica	Beech oil
12. Sinapis nigra & arvensis	Oil of mustard
13. Helianthus annuus & perennis	Oil of sunflower
14. Brassica napus & campestris	Rapeseed oil
15. Ricinus communis	Castor oil
16. Nicotiana tabacum & rustica	Tobacco-seed oil
17. Prunus domestica	Plum-kernel oil
18. Vitis vinifera	Grapeseed oil
19. Theobroma cacao	Butter of cacao
20. Laurus nobilis	Laurel oil
21. Arachis hypogæa	Ground-nut oil.

The following table contains a copious list of plants which yield volatile oils. The part of the plant from which it is extracted, and the English name of the oil, are added in separate columns.

Plants.	Parts.	Oil of	Colour.
1. Artemisia absynthium	Leaves	Wormwood	Green
2. Acorus calamus	Root	Sweet flag	Yellow
3. Myrtus pimenta	Fruit	Jamaica pepper	Yellow
4. Anethum graveolens	Seeds	Dill	Yellow
5. Angelica archangelica	Root	Angelica	
6. Pimpinella anisum	Seeds	Anise	White
7. Illicium anisatum	Seeds	Stellat. anise	Brown
8. Artemisia vulgaris	Leaves	Mugwort	
9. Citrus aurantium	Rind of the fruit	Bergamot	Yellow
10. Meloleuca leucodendra	Leaves	Cajeput	Green
11. Eugenia caryophyllata	Capsules	Cloves	Yellow
12. Carum carui	Seeds	Caraways	Yellow
13. Amomum cardamomum	Seeds	Card. seeds	Yellow
14. Carlina acaulis	Roots	....	White
15. Scandix chaerefolium	Leaves	Chervil	Sulph. yellow
16. Matricaria chamomilla	Petals	Chamomile	Blue
17. Laurus cinnamomum	Bark	Cinnamon	Yellow
18. Citrus medica	Rind of the fruit	Lemons	Yellow
19. Cochlearia officinalis	Leaves	Scurvy grass	Yellow
20. Copaifera officinalis	Extract	Copaiba	White
21. Coriandrum sativum	Seeds	Coriand. seed	White
22. Crocus sativus	Pistils	Saffron	Yellow
23. Piper cubeba	Seeds	Cubeb pepper	Yellow
24. Laurus culilaban	Bark	Culliaban	Brown yellow
25. Cuminum cymium	Seeds	Cummi	Yellow
26. Inula helenium	Roots	Elecampane	White
27. Anethum fœniculum	Seeds	Fennel	White
28. Croton eleutheria	Bark	Cascarilla	Yellow
29. Maranta galanga	Roots	Galanga	Yellow
30. Hyssopus officinalis	Leaves	Hyssop	Yellow
31. Juniperus communis	Seeds	Juniper	Green
32. Lavendula spica	Flowers	Lavender	Yellow
33. Laurus nobilis	Berries	Laurel	Brownish
34. Prunus laurocerasus	Leaves	Laurocerasus	
35. Levisticum logusticum	Roots	Loveage	Yellow
36. Myristica moschata	Seeds	Mace	Yellow
37. Origanum majorana	Leaves	Marjoram	Yellow

Plants.	Parts.	Oil of	Colour.
38. Pistacia lentiscus	Resin	Mastich	Yellow
39. Matricaria parthenium	Plant	Motherwort	Blue
40. Melissa officinalis	Leaves	Balm	White
41. Mentha crispa	Leaves	....	White
42. ——— piperitis	Leaves	Peppermint	Yellow
43. Achillea millefolium	Flowers	Millefoil	Blue and green
44. Citrus aurantium	Leaves	Neroli	Orange
45. Origanum creticum	Flowers	Spanish hop	Brown
46. Apium petroselinum	Roots	Parsley	Yellow
47. Pinus sylvestris & abies	Wood and resin	Turpentine	Colourless
48. Piper nigrum	Seeds	Pepper	Yellow
49. Rosmarinus officinalis	Plant	Rosemary	Colourless
50. Mentha pulegium	Flowers	Pennyroyal	Yellow
51. Genista canariensis	Root	Rhodium	Yellow
52. Rosa centifolia	Petals	Roses	Colourless
53. Ruta graveolens	Leaves	Rue	Yellow
54. Juniperus sabina	Leaves	Savine	Yellow
55. Salvia officinalis	Leaves	Sage	Green
56. Santalum album	Wood	Santalum	Yellow
57. Laurus sassafras	Root	Sassafras	Yellow
58. Satureia hortensis	Leaves	Satureia	Yellow
59. Thymus serpillum	Leaves and flowers	Thyme	Yellow
60. Valeriana officinalis	Root	Valerian	Green
61. Kæmpferia rotunda	Root	Zedoary	Greenish blue
62. Amomum zinziber	Root	Ginger	Yellow
63. Andropogon schænanthum	....	Sira	Brown

Several of the gum-resins, as myrrh and galbanum, yield an essential oil; and likewise the balsams, as benzoin, &c.

Oils (Empyreumatic vegetable). Almost every vegetable matter when subjected by dry distillation affords a quantity of oil, varying according to the nature of the substance, and the circumstance of the experiment. The oil thus produced has not been subjected to very accurate examination, yet may be described as possessing the following characters. Its colour is yellowish-red passing into blackish-red, it has a strong odour, and an acrid empyreumatic taste; it is more volatile than the fixed oils, but less so than the proper essential ones: by re-distillation with a little water it comes over nearly colourless, and more volatile than before, though still possessed of much of its empyreumatic flavour. Two of these oils, namely, tar, and birch oil, are of considerable importance; for an account of the first we shall refer the reader to the article Turpentine. The latter is prepared in Russia, by charring birch wood in a close oven; the watery acid and oil are collected in a large receiver, and the latter product being the highest, is skimmed off from the surface of the water.

This oil has a peculiar scent, and is said to drive away worms and other insects, on which account it is used in the dressing of Russia leather, to which it communicates those properties that render it so much esteemed by the binders of books.

Oils (Fixed animal). All animals, except those included in the class of insects, contain oil; the quantity, however, of which, as well as the situation which it principally occupies in the body, is subject to considerable variety. In all cases it is contained in peculiar receptacles of cellular membrane; but these receptacles in quadrupeds are for the most part but sparingly dispersed among the muscular fibre, are more abundant in the bones, and most of all in the cavity of the abdomen, and especially attached to the kidneys. The hog, however, is an exception to this, the principal part of his fat being deposited between the skin and the muscles. In birds the chief seat of the oil is immediately below the skin, and in water-fowl it is particularly secreted by a collection of glands in the rump. In the warm-blooded fish, as the whale, the oil is chiefly contained in the head and jaw-bones, and is interposed in vast abundance between the skin and the muscular flesh. In the cold-blooded fish it is contained in the liver, as in the shark, the cod, and the ling; or is dispersed through the whole body, as in the sprat, the herring, and pilchard. While the fat remains in the living body it is always in a fluid or semi-fluid state; but after it has been extracted, and is exposed to the common temperature, a remarkable difference in its consistence is observed. The oil or fat investing the kidneys of quadrupeds is called suet or tallow, and is the most solid and hardest of any; the next in hardness is the fat of bones; and that in which the muscles are imbedded is the next in degree: the fat of the hog (called lard) is the least solid.

The fat of birds is seldom so solid as hog's lard, and in many species is actually fluid.

The fat or oil of fish is almost always fluid at common temperature. Besides the above varieties of animal oil, there is yet another contained in the yolk of eggs, and which may be extracted by simple pressure after the yolk has been coagulated by heat.

Animal oil in its purest state is obtained by cutting fresh suet into shreds and liquefying it in boiling water, and then passing it through a piece of thin gauze, in order to separate the cellular membrane. When thus purified, it is of a yellowish-white colour, moderately hard, of a mild taste, and nearly destitute of odour or flavour: it is combustible, like the fixed vegetable oils, and agrees also with these in the changes produced upon it, the alkalies, and other chemical re agents. All the animal oils, however, belong to the class of unctuous or fat oils, none of them being either drying in itself, or capable of becoming so by means of litharge or other substances.

When fat is exposed to dry distillation, as soon as it acquires the temperature of about 400° it emits a white, acrid, and disagreeable vapour; as the heat increases, some of the oil comes over into the receiver, and what remains behind acquires a blackish tinge; empyreumatic, acetous,

and sebacic acids then make their appearance, together with carburetted hydrogen, and carbonic acid of a most remarkable offensive odour. This circumstance shows that there is a real difference between animal and vegetable oils, though it has not yet been pointed out by chemical analysis. The coarser kinds of animal oil being extracted by means of putrefaction and a strong heat, possess a much more disagreeable odour than any of the vegetable oils, and when rancid disengage ammonia by the action of the fixed caustic alkalies, in which also they differ from the latter.

The fish oils when rancid, and from the mode of their extraction they never are otherwise, are for the most part thick and glutinous, which in some measure disqualifies them from burning, and for some other uses to which they are applied. Many attempts, for the most part without success, have been made to bring them to better state; but, as appears from the experiments of Mr. Dossie, they may be considerably improved by means of fixed alkali and chalk, by which the albumen and gluten are thrown down, and the supernatant oil, after due rest, may be poured off in a fluid state, and very sensibly amended both in consistence, in odour, and fitness for burning. Animal oils are substances of great economical importance: they are used as food, and in medicine as the base of various unguents: they are largely employed in the manufacture of soap, and for burning either in lamps or in the form of candles.

Oil (Volatile animal); or Dippel's oil. As in the vegetable kingdom oil is produced by the destructive distillation of various substances that contain none in their natural state; so it is with respect to the animal kingdom. If albumen or gluten be distilled at a dry heat, there arises together with the ammonia and carburetted hydrogen a quantity of fetid black oil; this was made the subject of various experiments, first by Dippel a chemist of Berlin, and afterwards by Rouelle. From the concurrent labours of these enquirers it appears, that if this oil is rectified by three successive distillations from the surface of water, or by a greater number without water, it becomes at length quite colourless and transparent; it has a powerful, but somewhat aromatic, odour, and is nearly as light and volatile as ether. It contains a little ammonia, and hence changes the colour of syrup of violets green; it is sparingly soluble in water, and largely so in oils, ether, and alcohol. It combines both with acids and alkalies into imperfect soaps; it is very inflammable; and, like the vegetable essential oils, may be set on fire by strong nitrous acid.

If exposed even to the light it is partly decomposed, losing its transparency, and becoming of a brown colour. It was formerly employed in medicine, but is now wholly disused.

Oil (Almond). See Amygdala.
Oil (Castor). See Ricinus.
Oil of mace. See Oleum macis.
(Olive). See Oliva.
(Palm). See Palm oil.
Oil (Rock). See Petroleum.
Oil (Nut). See Ricinus.

To Oil. *v. a.* (from the noun.) To smear or lubricate with oil (*Wotton*).

OILCLOTH, linen cloth or canvas painted either plainly or ornamentally in oil-colours.

The following account of Mr. William Anderson's method of painting linen cloth in oil-colours, so as to be more pliant, durable, and longer impervious to water, than in the usual mode, is abridged from vol. xxvi. Transactions of the Society of Arts.

The paint usually laid upon canvas hardens to such a degree as to crack, and eventually to break the canvas, which renders it unserviceable in a short time: but the canvas painted in the new manner is so superior, that the Navy Board has ordered all canvas used in the navy to be thus prepared; nor is this the only advantage, for a saving of one guinea is made in every 100 square yards of canvas so painted.

The old mode of painting canvas in the king's yards was to wet the canvas, and prime it with Spanish brown, then to give it a second coat of a chocolate colour made by mixing Spanish brown and black paint, and lastly to finish it with black.

The new method is to grind 96 lb. of English ochre with boiled oil, and add 16 lb. of black paint; which mixture forms an indifferent black. A pound of yellow soap dissolved in six pints of water over the fire is mixed, while hot, with the paint. This composition is then laid upon the canvas (without its being wetted as in the usual way) as stiff as can conveniently be done with the brush, so as to form a smooth surface. The next day, or still better on the second day, a second coat of ochre and black without any or but a very small proportion of soap is laid on; and allowing this coat an intermediate day for drying, the canvas is finished with black paint as usual, three days being then allowed for it to dry and harden; it does not stick together when taken down folded together in cloths containing 60 or 70 yards. Canvas finished entirely with the composition, leaving it to dry one day between each coat, will not stick together, if laid in quantities.

From actual trials of near four years, the solution of yellow soap is a preservative to red, yellow, and black paints, when ground in oil and put into casks; as they acquired no improper hardness, and dried in a remarkable manner when laid on with the brush, without the use of the usual drying articles.

Immense quantities of unserviceable ships' hammock cloths have been destroyed at the king's yards in order to prevent embezzlement; but means have now been found to obtain the colour laid on them at a small expense, which is effected by burning this unserviceable canvas, taking care to rake aside the ashes and sprinkle them with water, in order to prevent too great a degree of calcination. The ashes are then prepared for grinding, by being sifted. Thus 4 cwt. of dry colour valued at 9l. 6s. have, at the expense of 6s. been obtained from a ton of canvas. Canvas painted with black paint only produces a black colour; if painted black upon a yellow or red ground, it produces a dark chocolate; if painted lead colour, it produces a dark lead.

A great quantity of paint being required at Portsmouth yard, and the allowed number of hands not being sufficient to grind it in the

common mills, induced a trial of employing one man to grind with four mills at a time, by placing two mills on each side of the winch. A space of two feet six inches is allowed between the two pairs of mills, for the man to stand between them; and the mills, of each pair are placed so close as only to leave room for a fly wheel to play between them. Fly wheels at the extremity of the axis are impediments.

We have no doubt but that these processes are considerable improvements. As soap is so well known to be miscible with oily substances, it is surprising that it or the alkali of which it is composed have not yet been brought into use in the composition of oil colours, either for immediate consumption or for painting stores. (*Retrospect of Discoveries*, vol. v. p. 88.)

OILEUS, a king of the Locrians, who married Eriope, by whom he had Ajax, called Oileus, from his father, to discriminate him from Ajax, the son of Telamon. He had also another son called Medon, by a courtezan called Rene. Oileus was one of the Argonauts.

OIL-COLOUR. *s.* Colour made by grinding coloured substances in oil (*Boyle*).

OILINESS. *s.* (from *oily*.) Unctuousness; greasiness; quality approaching to that of oil.

OILMAN. *s.* (*oil* and *man.*) One who trades in oils and pickles.

OIL-MILL, in mechanics, a mill used for expressing oil from different sorts of grain, chiefly lint-seed and rape-seed. These seeds, when brought from market by the miller, are very hard and smooth. They must first be bruised until every grain is broken, and afterwards subjected to a most immense pressure, which forces out the oil. Plates 111, 112, 113, are drawings of an oil-mill driven by a fall of water. Plate 111 is an elevation of the mill, shewing the water wheel. Plate 112 is an elevation at right angles to the former; and Plate 113 contains separate drawings of various parts of the mill. The same letters of reference are used in all the figures. A, Plate 111, fig. 1, is the water-wheel which is undershot, that is, the water passes under it, and turns the wheel by its momentum. (See WATER-WHEEL.) It is framed on a strong octagonal shaft BB, turning on two gudgeons fixed in its ends. D is the pit-wheel, or great cog-wheel, made of cast iron, with wooden cogs fixed in its rim: there are 80 of these cogs, by which it turns an iron wheel E, of 37 teeth, fixed on an horizontal shaft F, called the tumbling shaft. G is an iron cog-wheel, with 35 iron teeth, called a bevelled-wheel (that is where the teeth are not parallel to the axis); it turns another bevelled-wheel H, of 72 wooden teeth, fixed upon a vertical shaft, which gives motion to the rolling stones IK, where the seed is bruised. L is a pully or rigger, fixed upon the tumbling shaft, wh[illegible] has an endless chain running round it, [illegible] also over a small rigger *a*, Plate 112, which is shewn in another position in fig. 3; it is fixed upon a small shaft *b*, which has an iron bevelled wheel upon the end of it, to turn another bevelled wheel upon the upper end of a vertical spindle *d*, the use of which we shall explain hereafter.

The great pit-wheel turns an iron cog-wheel *e*, fig. 2, on whose spindle is fixed one of her iron rollers for bruising the seed.

The tumbling shaft F has two lifters, MN, projecting from it; which, as it turns round, lifts up and lets fall the stampers of the press, which we shall describe by and by.

The lint or rape-seed, from which the oil is to be expressed, is first broken between rollers, shewn figs. 2, 9, and 10; *fg* represent the rollers made of cast iron, and truly turned. The spindles of these rollers turn in brass bushes, fixed in the two iron frames *kk*, bolted down to the woodwork. These frames have long mortices in them, in one end of which the bushes for the pivots of the roller *f* are placed: the other bushes slide in the mortices, and are pushed up by screws *l*, screwed through them, so that the roller can be set at any distance apart by turning these screws; *mm* are two cog-wheels of 10 teeth, each fitted on the ends of the rollers pivots: they make both rollers turn together. The seed is put into a hopper *h*, supported at some distance above the rollers; it runs out at an opening in the bottom into a trough *i*, called the shoe, which is continually shaken by means of a piece of wood nailed to it, which rests upon the cog-wheel *m*, and by this means continually feeds the rollers with a small quantity of seed, without any danger of choaking them up. The seed falls from the end of the shoe *i* between the rollers, which, as they turn round, draw the seed in between them, and bruise it. It is proper to have a piece of iron plate, nailed to some part of the frame, pressing against the rollers, so as to scrape off the seed which may adhere to them; the seed after having passed between the rollers falls upon an inclined board placed in the frame beneath them, and is thus shot down in a heap before the rollers, from whence it is conveyed by a labourer to the rolling stones IK, figs. 1, 4, and 5, of which *n* is the main shaft, whose lower pivot turns in a brass socket, in the middle of the bed millstone O, which is supported upon brickwork. The shaft *n* has an oblong mortice through it to receive the iron axle-tree *p*, on which the two running stones IK turn; *qq* are two bars bolted to the shaft to support boards which have square holes through them, for the pieces *r* and *s* to slide up and down in: *tv* are two sweeps fastened to the end of the rods *r* and *s*: these rods are connected by a lever, so that when one is up the other is down. Th[illegible] bed-stone O has a wooden curb P rou[illegible] to prevent the seed from being thrown [illegible] the stone. The seed is thrown upon the bed-stone O with a shovel, and as the stones roll round they pass over it, and crush it by their weight. The gathering sweep *t* is let down, and the other drawn up, as before described. As the stones turn, this sweep collects all the seed upon the bed-stone into one ridge, over

which the stones pass and bruise it; when the seed is by this means sufficiently ground, the sweep *t* is raised and kept up by a pin put through the rod, and the discharging sweep *v* at the same time let down, which, being curved the contrary way, as it turns round throws all the seed upon the stone out at an opening in the curb P, made by taking out a loose piece *r*. The seed thus ground is carried to the chaufer-pan, figs. 2 and 3, where it is heated previous to being pressed. This consists of a small fire-place in which charcoal is burnt. The seed is contained in a copper-pan R, set over the fire; and the seed is prevented from burning to the bottom of the pan by a cross piece of iron fixed to the lower end of the spindle *d*, which, as it turns round, stirs the seed. The sides of this cross are set inclined so as to scrape the seed from the bottom of the pan, and throw it over the back of the piece. The spindle *d* is turned by bevelled wheel-work, as before described. When the seed is sufficiently heated, the rope 1 is pulled down, which by means of the lower 2 raises up the cross-piece at the bottom of the spindle *d*, so that the contents of the pan may be turned out into two funnels 33, to the lower end of which bags of flannel are hung; these bags are wrapped longways in a strong leather belt, and are carried to the press, figs. 1, 6, 7, and 8. SS are two thick planks of wood, firmly bolted together with beams TT between them. The space between these beams is filled up by the bags of seed at *aa*, the pressing wedge *b*, the discharging wedge *c*, and blocks of wood to keep them at the proper distance apart. The beams TT have cross pieces upon them, between which the stampers VW slide up and down. They are lifted up by nippers MN, fixed upon the shaft F, which take hold of tappets *w* fixed to the stampers, raise them to the proper height, and then let them fall. When they are to be stopped the workman pulls a rope *x* or *y*, which raises a lever 4 or 5, and holds up the stamper. The stamper V is represented as held up in this manner, and the other is raised up and let fall upon the wedge *b*, driving it into the press until the bags of seed at *aa* are sufficiently pressed. The oil runs out at small holes in the bottom of the press into a pot placed to receive, as in fig. 7, when the pressure is to be released. The stamper W is held up by pulling the rope *x* when the stamper is at the highest, and the rope hooked fast; V is then let fall upon the inverted wedge *e*, and drives it down, which releases the pressure, so that the wedge *b* and the bags of seed *aa* can be tak[illegible] out and fresh ones put in, as be[illegible]crib[illegible]. The inverted wedge *e* is su[illegible] from a wooden spring 6, which rais[illegible]p, as in the figure (when the wedge *b* is taken out), ready for the next pressing.

OILSHOP. *s* (*oil* and *shop*.) A shop where oils and pickles are sold.

OILY. *a.* (from *oil.*) 1. Consisting of oil; containing oil; having the qualities of oil (*Digby*). 2. Fatty; greasy (*Shakspeare*).

To OINT. *v. a.* (*oint*, Fr.) to anoint; to smear with something unctuous.

OINTMENT. *s.* (from *oint.*) Unguent; unctuous matter to smear any thing. See PHARMACY and UNGUENT.

OIRA, an ancient town of Naples, in Terra d'Otranto, with a bishop's see, and an old castle. It is seated at the foot of the Apennines, 20 miles N.E. of Tarento. Lon. 17. 54. E. Lat. 40. 38 N.

OISANS, a town of France, in the department of Isere, 28 miles S.E. of Grenoble. Lon. 6. 25 E. Lat. 45. 0 N.

OISE, a department of France, including part of the late province of the isle of France. It takes its name from a river, which has its source in the Ardennes, and falls into the Seine, near Pontoise. Beauvais is the capital.

OKEHAM. See OAKHAM.

OKEHAMPTON. See OAKHAMPTON.

OLAX, in botany, a genus of the class triandria, order monogynia. Calyx entire, corol funnel-form, three-cleft; nectary bifid; berry three-celled, many-seeded. Two species—one a tree of Ceylon; the other a thorny shrub of Coromandel.

OLD. *a.* (ealo, Saxon.) 1. Past the middle part of life; not young (*Shakspeare*). 2. Decayed by time (*Deuteronomy*). 3. Of long continuance; begun long ago (*Camden*). 4. Not new (*Bacon*). 5. Ancient; not modern (*Addison*). 6. Of any specified duration (*Shakspeare*). 7. Subsisting before something else (*Swift*). 8. Long practised (*Ezekiel*). 9. Of old; long ago; from ancient times (*Dryden*).

OLD AGE. See LONGEVITY and LIFE.

OLDCASTLE (Sir John), called the Good Lord Cobham, was born in the reign of Edward III. and was the first author as well as the first martyr among the English nobility: he obtained his peerage by marrying the heiress of that lord Cobham who with so much virtue and patriotism opposed the tyranny of Richard II. By his means the famous statute against provisors was revived, and guarded against by severer penalties; he was one of the leaders of the reforming party; was at great expence in procuring and dispersing copies of Wickliffe's writings among the people, as well as by maintaining a number of his disciples as itinerant preachers. In the reign of Henry V. he was accused of heresy; the growth of which was attributed to his influence. Being a domestic in the king's court, the king delayed his prosecution that he might reason with him himself; but not being able to reclaim him to the church of Rome, he in great displeasure resigned him to its censure. He was apprehended, and condemned for heresy; but escaping from the Tower, lay concealed for four years in Wales, until the rumour of a pretended conspiracy was raised against him, and a price set upon his head: he was at last seiz[illegible]d executed in St. Giles's Fields; being hung alive in chains upon a gallows, and burned by a fire placed underneath. He wrote Twelve Conclusions, addressed to the Parliament of England.

OLDEN, *a.* Ancient: not in use.

OLDENBURG, a fortified town of Westphalia, capital of the duchy of its name, with a citadel, in which a governor resides. The church of St. Lambert contains the tombs of the last counts of Oldenburg, which are very curious. It is seated on the Hunta, 22 miles W. of Bremen. Lon. 8. 6 E. Lat. 53. 7 N.

OLDENBURG, a town of Lower Saxony, in the duchy of Holstein, seated near the Baltic, 28 miles N. of Lubec.

OLDENBURG (Henry), who wrote his name sometimes Grubendol, reversing the letters, was a learned German gentleman, and born in the duchy of Bremen in the Lower Saxony, about the year 1626, being descended from the counts of Aldenburg in Westphalia; whence his name. During the long English parliament in the time of Charles I. he came to England as consul for his countrymen; in which capacity he remained at London in Cromwell's administration. But being discharged of that employment, he was engaged as tutor to the lord Henry Obryan, an Irish nobleman, whom he attended to the university of Oxford; and in 1656 he entered himself a student in that university, chiefly to have the benefit of consulting the Bodleian library. He was afterwards appointed tutor to lord William Cavendish, and became intimately acquainted with Milton the poet. During his residence at Oxford he became also acquainted with the members of that society there, which gave birth to the Royal Society; and upon the foundation of this latter he was elected a member of it: and when the society found it necessary to have two secretaries, he was chosen assistant to Dr. Wilkins. He applied himself with extraordinary diligence to the duties of this office, and began the publication of the Philosophical Transactions with No. 1, in 1664. In order to discharge this task with more credit to himself and the Society, he held a correspondence with more than seventy learned persons, and others, upon a great variety of subjects, in different parts of the world. This fatigue would have been insupportable, had he not, as he told Dr. Lister, managed it so as to make one letter answer another; and that, to be always fresh, he never read a letter before he was ready immediately to answer it: so that the multitude of his letters did not clog him, nor ever lie upon his hands. Among others, he was a constant correspondent of Mr. Robert Boyle, and he translated many of that ingenious gentleman's works into Latin.

About the year 1674 he was drawn into a dispute with Mr. Hook, who complained, that the secretary had not done him justice, in the History of the Transactions, with respect to the invention of the spiral spring for pocket watches; the contest was carried on with some warmth on both sides, but was at length terminated to the honour of Mr. Oldenburg; for, pursuant to an open representation of the affair to the Royal Society, the council thought fit to declare, in behalf of their secretary, that they knew nothing of Mr. Hook having printed a book intitled Lampas, &c.; but that the publisher of the Transactions had conducted himself faithfully and honestly in managing the intelligence of the Royal Society, and given no just cause for such reflections.

Mr. Oldenburg continued to publish the Transactions as before, to No. 136, June 25, 1677; after which the publication was discontinued till the January following; when they were again resumed by his successor in the secretary's office, Dr. Nehemiah Grew, who carried them on till the end of February 1678. Mr. Oldenburg died at his house at Charlton, between Greenwich and Woolwich, in Kent, August 1678, and was interred there, being 58 years of age.

He published, besides what has been already mentioned, 20 tracts, chiefly on theological and political subjects; in which he principally aimed at reconciling differences, and promoting peace.

OLDENLANDIA, in botany, a genus of the class tetrandria, order monogynia. Corol one-petal, four-cleft; calyx four-parted, superior; capsule two-celled, inferior, many-seeded. Twelve species; chiefly natives of the East Indies, Cape, and South America.

OLDFASHIONED. *a.* (*old* and *fashion.*) Formed according to obsolete custom (*Dryd.*).

OLDFIELD (Ann), a famous actress, was born in London, in 1683. Sir John Vanburgh recommended her to Mr. Rich, patentee of the king's theatre, who gave her an engagement, soon after which she formed a connection with Arthur Maynwaring, esq. after whose death she attached herself to general Churchill. She had one son by the former of these gentlemen, and another by the general. Mrs. Oldfield long continued the favourite of the town in genteel comedy; and at her death, in 1730, her corpse lay in state in the Jerusalem Chamber, from whence it was conveyed to Westminster-abbey.

OLDHAM, a town in Lancashire, built on high ground, on a branch of the Medlock and near the Irk, whose streams carry on the machinery, &c. of numerous manufactures.— It is four miles N. of Manchester.

OLDHAM (John), an English poet, was born at Shipton in Gloucestershire, in 1658. He received his academical education at Edmund hall, Oxford, where he proceeded B.A. and afterwards became usher to the free-school at Croydon in Surrey. Some of his poems falling in the way of the earls of Rochester and Dorset, they quickly released him from that situation, and he was appointed tutor to the grandsons of sir Edmund Thurland, and afterwards to a son of sir William Hickes. He next resided with the earl of [illegible]ingston, at whos[illegible]at he died of the small-pox, [illegible]3, aged [illegible]. His works have been printed in 3 vols. 12mo. They are principally satirical, and frequently, it is to be lamented, licentious. The most admired are his four satires on the Jesuits.

OLDISWORTH (William), an English writer, who was one of the authors of the Examiner. He also published a volume, called

State Tracts, and another entitled State and Miscellany Poems, 8vo. &c. He died in 1734.

OLD-MAN OF THE WOODS. See SCINIA.

OLD-MAN'S BEARD. See CLEMATIS.

OLDMIXON (John), a political writer, and historian, was born near Bridgwater in Somersetshire. He became a violent opponent of the Stuart family, in the reign of queen Anne, and attacked the best writers of that period with so much violence, that Pope has given him a conspicuous place in his Dunciad. He obtained a place in the Customhouse at Bridgwater, where he died in 1742. He wrote, 1. A History of the Stuarts, folio. 2. A Volume of Poems, 8vo. 3. The Life of Queen Anne, and other works.

OLDNESS. *s.* (from *old.*) Old age; antiquity; not newness (*Shakspeare*).

OLD WIFE, in ichthyology. See LABRUS.

OLEA. Olive. In botany, a genus of the class diandria, order monogynia. Corol fourcleft, the segments sub-ovate; drupe onecelled, one-seeded. Seven species scattered over the different quarters of the globe. The species chiefly cultivated are,

1. O. Europæa. European olive. An evergreen tree common to the woods of the south of France, Spain, and Italy, with lanceolate, very entire, grey, ferruginous leaves, downy or silvery underneath: flowers in small axillary branches, small white, with short tubes spreading open at the top; fruit a superior-berried drupe, of an oblong spheroidal form, and of a yellowish green colour, turning black when ripe. This plant affords a great abundance of varieties and subvarieties, differing chiefly in the shape of the leaf, or the size of the fruit. With a little protection, in severe frost it may be maintained against walls in the neighbourhood of London; and in Devonshire it will grow as a standard in more open situations, and is seldom injured by the frosts: but we have not warmth of climate enough to bring the fruit to perfection.

The olive abroad is easily propagable by shoots; but the best bearing trees are reared from grafts on the stocks of olives of an inferior kind. Olive-shoots are ingrafted when in flower: the trees are commonly planted in the form of a quincunx, and in rows at a considerable distance from one another. Between the rows vines are usually planted or grain is sown. Like many other fruit-trees, olives bear well only once in every two years. In England the olive is propagated by layers alone.

Olives have an acrid, bitter, and extremely unpleasant taste, though pickling renders them less disagreeable; and fashion, that regulates our food as well as our dress, has so long and so generally proposed them as a luxury, that the unpleasantness of their taste is gradually gotten the better of, and even relished by those who are much accustomed to them. The Lucca olives, which are smaller than the other sorts, have the weakest taste; the Spanish, which are the largest, have the strongest; the Provence, which are of a middle sized, are usually most approved.

Olives designed for preservation are gathered before they are ripe. The art of preparing them consists in divesting them of their bitterness, in preserving their green colour, and in impregnating them with a brine of aromatised sea-salt, which very much improves the taste they would otherwise possess. In some parts of Provence, after the olives have lain some time in the brine, they remove them, take out the kernel, and put a caper in its place. These olives are preserved in the purest oil; and when prepared, strongly stimulate the stomach in winter. Ripe olives are eaten without any preparation, excepting a little seasoning of pepper, salt, and oil; for they are extremely tart, bitter, and erosive.

The most valuable part of the olive, however, is its oil. The quantity of this depends upon the nature of the soil in which the plant grows, on the kind of olive which is cultivated, on the care taken in gathering and expressing the fruit, and on the separation of the part to be extracted. If the olives be unripe, the oil will be intolerably bitter; if over-ripe, it will be unguinous. The kind of trees that yield coarse oil have this property still expressed for the use of lamps and soaperies.

The olives for expression are gathered in November or December. They should be put in hair or woollen baskets, and pressed immediately to obtain a pure and fine oil: for inferior purposes they may remain in heaps, and be pressed with less care in the grass. The fruits are first bruised in a round trough, under a mill-stone, rolling perpendicularly over them; and when sufficiently mashed are put into the trough of an olive-press, bearing down upon them by means of a strong screw. By turning the screw all the liquor is pressed out of the olives, and is called virgin-oil; after which hot water being poured upon the remainder in the press, a coarser oil is obtained. Olive oil will not keep good longer than a year; after which period it becomes rancid.

Oil of olives is largely employed in medicine in the form of balsams, liniments, emollients, and ointments. It is found useful as an antidote against the poison of vipers, and insects of various kinds. The best soap is made of it, mixed with Alicant salt-wort and quicklime.

2. O. Capensis: Cape olive. A shrub, with a straight jointed trunk; leaves ovate, very entire, flat or waved, paler beneath; flowers white, small, in racemes, appearing in June and July.

3. O. Americana. American olive. A plant with leaves opposite, lanceolate-elliptic, very entire, ever-green; racemes narrowed, axillary; all the bractes permanent, connate, small; segments of the corol resolute; male and female flowers on the same plant with hermaphrodites.

4. O. fragrans. Sweet-scented olive. A large tree of Japan; branches obscurely four-

cornered; leaves decussate, lanceolate, serrate; peduncles lateral, aggregate, one-flowered, very fragrant.

Olea europea. The systematic name of the plant from which the olive oil is obtained. See Oliva.

OLEA'GINOUS. *a.* (*oleaginus*, Lat.) Oily; unctuous (*Arbuthnot*).

OLEA'GINOUSNESS. *s.* (from *oleaginous*) Oiliness (*Boyle*).

OLEANDER. See Nerium.

OLEARIUS (Godfrey), a German, born at Hall in Saxony, 1689. He was professor of Greek and divinity at Leipsic, and was ten times rector of that university. He died 1713. He was a great contributor to the Leipsic acts, and wrote works on theology, philosophy, &c.

Olearius (Godfrey), son of the preceding, was born at Leipsic, 1672. He possessed great abilities, and after visiting Holland studied at Oxford, and became professor of Greek and Latin, and afterwards of divinity at Leipsic. He died in the flower of life, 1715. He published a Dissertation on the Worship of God, by J. C.; a History of Rome and Germany; besides a Latin translation of Stanley's History of Philosophers, 4to. &c.

Olearius (Adam), a German writer, six years secretary to the embassy, from the duke of Holstein, to Muscovy, and Persia. He published an account of his journey, with maps and figures, folio, translated into French by Wicquefort. He also published an abridgement of the chronicles of Holstein, from 1448, to 1663. He died 1671, aged 68.

OLEAROS, or Oliros, one of the Cyclades, about 16 miles in circumference, separated from Paros by a streight of seven miles.

OLEASTER. See Elæagnus.

OLECRANON. (*olecranon*, ὠλεκρανον, from ωλενη, the ulna, and κρανον, the head.) The elbow or head of the ulna, upon which a person leans.

OLEN, a Greek poet of Lycia, who flourished some time before the age of Orpheus, and composed many hymns, some of which were regularly sung at Delphi on solemn occasions. (*Herodot.*).

OLENUS, a man who married Lethæa, a beautiful woman who preferred herself to the goddesses. She and her husband were changed into stones by the deities.

Olenus, or Olenum, a town of Peloponnesus, between Patræ and Cyllene. The goat Amalthæa, which was made a constellation by Jupiter, is called Olenia, from its residence there.

OLE'OSE. *a.* (*oleosus*, Lat.) Oily (*Floyer*).

OLERACEÆ, in botany. See Holeraceæ.

OLERON, an island of France, five miles from the W. coast, opposite the mouth of the Charente. It is 14 miles long and five broad, populous and fertile. This island was formerly in the possession of the crown of England; and here Richard I. compiled the code of maritime laws, called the Laws of Oleron, which are received by all nations in Europe, as the ground and substruction of all their marine constitutions.

Oleron, a town of France, in the department of Lower Charente, with a castle; seated on the E. side of the island of Oleron, 13 miles W.S.W. of Rochefort. Lon. 1. 15 W. Lat. 45. 48 N.

Oleron, a town of France, in the department of the Lower Pyrenees, and lately a bishop's see. It is seated on the Gave, 10 miles S.W. of Pau.

OLEUM. See Oil.

Oleum abietinum. The resinous juice which exudes spontaneously from the silver and red firs. It is superior to that obtained by wounding the tree.

Oleum amygdalæ. See Amygdalæ.

Oleum animale. An empyreumatic substance obtained by distillation from animal substances. It is sometimes exhibited as an antispasmodic and diaporetic, in the dose of from ten to forty drops.

Oleum anisi essentiale. The essential oil of aniseed possesses all the virtues attributed to the anisum, and is often given as a stimulant and carminative, in the dose of from five to eight drops, mixed with an appropriate vehicle. See Anisum.

Oleum camphoratum. In retensions of urine, rheumatic pains, distentions of the abdomen from ascites; tension of the skin from abscess, this is an excellent application.

Oleum carpathicum. A fine essential oil, distilled from the fresh cones of the tree, which affords the common turpentine. See Terebinthina vulgaris.

Oleum carui essentiale. The essential oil of carraways is an admirable carminative, diluted with rectified spirit into an essence, and then mixed with any proper fluid.

Oleum caryophylli aromatici essentiale. A stimulant aud aromatic preparation of the clove.

Oleum cedrinum. Essentia de cedro. The oil of the peel of citrons, obtained in a particular manner, without distillation, in Italy.

Oleum cinnamomi essentiale. A warm, stimulant, and delicious stomachic. Given in the dose of from one to three drops, rubbed down with some yolk of egg, in a little wine, it allays violent emotions of the stomach from mobid irritability, and is particularly serviceable in debility of the primæ viæ, after cholera morbus.

Oleum cornu cervi. This is applied externally as a stimulant to paralytic affections of the limbs.

Oleum e seminibus lini. Linseed oil is emollient and demulcent, in the dose of from half an ounce to an ounce. It is frequently given in the form of clyster in colics and obstipation. Cold drawn linseed oil, with lime water and extract of lead, forms in many instances the best application for burns and scalds.

Oleum e seminibus ricini. See Ricinus.

OLEUM GABIANUM. See PETROLEUM RUBRUM.

OLEUM JUNIPERI ESSENTIALE. Oil of juniper berries possesses stimulant, carminative, and stomachic virtues, in the dose of from two to four drops, and in a larger dose proves highly diuretic. It is often administered in the cure of dropsical complaints, when the indication is to provoke the urinal discharge.

OLEUM LAVENDULÆ ESSENTIALE. Though mostly used as a perfume, this essential oil may be exhibited internally in the dose of from one to five drops, as a stimulant in nervous head-aches, hysteria and debility of the stomach.

OLEUM LAURI BACCARUM EXPRESSUM. An anodyne and antispasmodic application, generally rubbed on sprains and bruises unattended with inflammation.

OLEUM LAURINUM. Oleum expressum baccarum lauri. An almost insipid fluid oil, obtained by expressing the berries of the bay-tree. It is principally used as a carminative in clysters.

OLEUM LIMONIS ESSENTIALE. The essential oil of lemons possesses stimulant and stomachic powers, but is principally used externally, mixed with ointments, as a perfume.

OLEUM LUCII PISCIS. See ESOX LUCIUS.

OLEUM MACIS. Oleum myristicæ expressum. Oil of mace. A fragrant sebaceous substance, expressed in the East Indies from the nutmeg. There are two kinds. The best is brought in stone jars, is somewhat soft, of a yellow colour, and resembles in smell the nutmeg. The other is brought from Holland in flat square cakes. The weak smell and faint colour warrants our supposing it to be the former kind sophisticated. Their use is chiefly external, in form of plaster, unguent, or liniment.

OLEUM MALABATHRI. An oil simliar in flavour to that of cloves, brought from the East Indies, where it is said to be drawn from the leaves of the cinnamon-tree.

OLEUM MENTHÆ PIPERITIDIS. Essential oil of peppermint possesses all the active principle of the plant. It is mostly used to make the simple water: mixed with rectified spirit it forms an essence, which is put into a variety of compounds, as sugar drops and trochisches, which are exhibited as stimulants, carminatives, and stomachics.

OLEUM MENTHÆ SATIVÆ. This essential oil is mostly in use for making the simple water, but may be exhibited in the dose of from two to five drops as a carminative, stomachic, and stimulant.

OLEUM NEROLI. Essentia neroli. The essential oil of the flowers of the Seville orange tree. It is brought to us from Italy and France.

OLEUM MYRISTICÆ ESSENTIALE. The essential oil of nutmegs is an excellent stimulant and aromatic, and may be exhibited in every case where such remedies are indicated with advantage.

OLEUM MYRISTICÆ EXPRESSUM. This is commonly called oil of mace. See OLEUM MACIS.

OLEUM OLIVÆ. See OLIVA.

OLEUM ORIGANI ESSENTIALE. A very acrid and stimulating essential oil. It is employed for alleviating the pain arising from caries of the teeth, and for making the simple water of marjoram.

OLEUM PALMÆ. See PALM OIL.

OLEUM PETRÆ. See PETROLEUM.

OLEUM PIMENTO ESSENTIALE. A stimulant and aromatic oil.

OLEUM PULEGII ESSENTIALE. A stimulant and antispasmodic oil, which may be exhibited in hysterical and nervous affections.

OLEUM RORIS MARINI ESSENTIALE. The essential oil of rosemary is an excellent stimulant, and may be given with great advantage in nervous and spasmodic affections of the stomach.

OLEUM SABINÆ ESSENTIALE. A stimulating emmenagogue; it is best administered with myrrh, in the form of bolus.

OLEUM SASSAFRAS. An agreeable stimulating stomachic, carminative, and sudorific.

OLEUM SINAPEOS. This is an emollient oil, the acrid principle of the mustard remaining in the seed.

OLEUM SUCCINI. Oil of amber is mostly used externally as a stimulating application to paralytic limbs, or those affected with cramp and rheumatism. Hooping cough, and other convulsive diseases, are said to be relieved also by rubbing the spine with this oil.

OLEUM SUCCINI RECTIFICATUM. Stimulant, diaphoretic, and antispasmodic virtues reside in this preparation, which is given in the dose of from ten to twenty drops, or more, in hysterical affections, epilepsy, and other convulsive diseases.

OLEUM SULPHURATUM. This, which was formerly called simple balsam of sulphur, is an acrid and stimulating preparation, and much praised by some in the cure of coughs and other phthisical complaints.

OLEUM SYRIÆ. A fragrant essential oil, obtained by distillation from the balm of Gilead plant. See MOLDAVICA.

OLEUM TEMPLINUM. Oleum templinum verum. A terebinthinate oil obtained from the fresh cones of the pinus abies of Linnéus.

OLEUM TERRÆ. See PETROLEUM.

OLEUM TEREBINTHINÆ. Bruises, sprains, rheumatic pains, and some affections of the joint, are relieved by liniments, in which this is the chief article. Mixed with ointments it is employed as a stimulating detergent.

OLEUM TEREBINTHINÆ RECTIFICATUM. Stimulant, diuretic, and sudorific virtues are attributed to this preparation, in the dose of from ten drops to twenty, which are given in rheumatic pains of the chronic kind, especially sciatica. Its chief use internally, however, is as an anthelmintic and styptic. Uterine, pulmonic, gastric, intestinal, and other hemorrhages, when passive, are more effectually relieved by its exhibition than by any other medicine.

Oleum vini. Stimulant and anodyne in the dose of from one to four drops.

Oleum vitrioli. See Sulphureous acid.

To OLFA'CT. *v. a.* (*olfactus*, Latin.) To smell (*Hudibras*).

OLFA'CTORY. *a.* (*olfactoire*, Fr. from *olfacio*, Latin.) Having the sense of smelling.

Olfactory nerves. (*nervi olfactorii*; from *olfactus*, the sense of smelling.) In neurology, the first pair of nerves are so termed, because they are the organs of smelling. They arise from the corpora striata, perforate the ethmoid bone, and are distributed very numerously on the pituitary membrane of the nose.

OLIBANUM. (*olibanum*, λιβανον; from *lebona*, Chald.) Thus. Frankincense. The gum-resin that is so called is the juice of the juniperus lycia. Juniperus foliis ternis undique imbricatis ovatis obtusis. C. O. Dioecia. Monadelphia. It is said to ooze spontaneously from the bark of the tree, appearing in drops or tears of a pale yellowish, and sometimes of a reddish, colour. Olibanum has a moderately strong and not very agreeable smell, and a bitterish, somewhat pungent taste; in chewing it sticks to the teeth, becomes white, and renders the saliva milky. It is esteemed as an adstringent, and though not in general use, is by many considered as a valuable medicine in fluor albus, and debilities of the stomach and intestines; applied externally in form of plaster it is said to be corroborant, &c. and with this intention it forms the basis of the emplastrum thuris.

OLID. Olidous. *a.* (*olidus*, Lat.) Stinking; fetid (*Boyle*).

OLIFIANT GASS, a name given by the Dutch chemists to carburetted hydrogen, or heavy inflammable gass. See Gass.

OLIGÆDRA, in natural history, the name of a genus of crystals composed of very few planes, as the names expresses. The word is compounded of ολιγος, a few, and εδρα, a plane. The bodies of this class are crystals of the imperfect kind; being composed of columns affixed irregulary to some solid body at one end, and the other terminated by a pyramid: but the column and pyramid being both pentangular, the whole consists only of ten planes, and not, as the common kind, of twelve.

OLIGA'RCHY. *s.* (ολιγαρχια). A form of government which places the supreme power in a small number; aristocracy (*Burton*).

OLINTHUS, the son of Timanthes the Sicyon painter, noted for the remarkable placidness of his dispositon.

OLIO, or Oglio, a savoury dish, or food, composed of a great variety of ingredients; chiefly found at Spanish tables. The forms of olios are various. To give a notion of the strange assemblage, we shall here add one from an approved author. Take rump of beef, neats tongues boiled and dried, and Bologna sausages; boil them together, and after boiling two hours, add mutton, pork, venison, and bacon, cut in bits; as also turnips, carrots, onions, and cabbage, borage, endive, marigolds, sorrel, and spinach: then spices, as saffron, cloves, mace, nutmeg, &c. This done, in another pot put a turkey or goose, with capons, pheasants, wigeon, sand ducks, partridges, teals and stock-doves, snipes, quails, and larks, and boil them in water and salt. In a third vessel, prepare a sauce of white wine, strong broth, butter, bottoms of artichokes, and chesnuts, with cauliflowers, bread, marrow, yolks of eggs, mace, and saffron. Lastly, dish the olio, by first laying out the beef and veal, then the venison, mutton, tongues, and sausages, and the roots over all; then the largest fowls, then the smallest, and lastly pour on the sauce.

OLITORY. (*olitorius*, Latin.) Belonging to the kitchen-garden (*Evelyn*).

OLIVA (Alexander), general of the Augustine monks, studied at Rimini, Bologna, and Perusa, and when at Rome, as general of his order, Pius II. created him a cardinal, 1460, and made him bishop of Camerino. He died at Tivoli 1463. His works are, de Christi ortu Sermones Centum; de Cœnâ cum Apostolis Factâ; de Peccato in Spiritu Sanctum.

Oliva, a seaport of W. Prussia, situate on a bay of the gulf of Dantzic. Here is a celebrated monastery, which contains several tombs of the dukes of Pomerania, and in it a peace was concluded in 1660, between the emperor of Germany and the kings of Sweden and Poland. It is 10 miles W.N.W. of Dantzic. Lon. 18. 32 E. Lat. 54. 24 N.

Oliva. The olive. The fruit of the olea europea of Linnéus. Olea foliis lanceolatis integerrimis, racemis axillaribus coarctatis. Hort. Kew. C. O. Monandria. Monogynia. The olive-tree, in all ages, has been greatly celebrated, and held in peculiar estimation, as the bounteous gift of heaven; it was formerly exhibited in the religious ceremonies of the Jews, and is still considered as emblematic of peace and plenty. The utility of the fruit is very extensive. Pickled olives, which are of two kinds, Spanish and French, are extremely grateful to many stomachs, and said to excite appetite and promote digestion; they are prepared from the green unripe fruit, which is repeatedly steeped in water, to which some quicklime or alkaline salt is added, in order to shorten the operation: after this they are washed and preserved in a pickle of common salt and water, to which an aromatic is sometimes added. The principal consumption, however, of this fruit is in the preparation of the common salad oil, or oleum olivæ of the pharmacopœias, which is obtained by grinding and pressing them when thoroughly ripe: the finer and purer oil issues first by gentle pressure, and the inferior sorts on heating what is left, and pressing it more strongly. The best olive oil is of a bright pale amber colour, bland to the taste, and without any smell: it becomes rancid by age, and sooner if kept in a warm situation. With regard to its utility, oil, in some shape, forms a considerable part of our food, both animal and vegetable, and affords much nourishment. With some however, oily substances do not unite with the contents of the stomach, and are frequently brought up by

eructation; this happens more especially to those whose stomachs abound with acid. Oil, considered as a medicine, is supposed to correct acrimony, and to lubricate and relax the fibres; and therefore has been recommended internally, to obviate the effects of various stimuli, which produce irritation, and consequent inflammation: on this ground it has been generally prescribed in coughs, catarrhal affections, and erosions. The oil of olives is successfully used in Switzerland against the tænia osculis superficialibus, and it is in very high estimation in this and other countries against nephritic pains, spasms, cholic, constipation of the bowels, &c. Externally it has been found an useful application to bites and stings of various poisonous animals, as the mad dog, several serpents, &c. also to burns, tumours, and other affections, both by itself or mixed in liniments, or poultices. Oil rubbed over the body is said to be of great service in dropsies, particularly ascites Olive oil enters several officinal compositions, and when united with water, by the intervention of alkali, is usually given in coughs and hoarsenesses. See OILS.

OLIVARES (Gaspar de Guzman, count de,) succeeded Uzeda as prime minister, and gained popularity by his wise and salutary regulations. His pride, however, created him many enemies, and occasioned not only the revolt of the Catalonians, but the separation of the Portuguese from the Spanish dominions. Olivares was dismissed with disgrace, and died of a broken heart at Toro, in 1643.

OLIVASTER. *a.* (*olivastre*, Fr.) Darkly brown; tawny (*Bacon*).

OLIVE. See OLEA and OLIVA.

OLIVE BARK TREE. See BUCIDA.

OLIVE CHYSOLITE. See OLIVINUS.

OLIVE SPURGE, in botany. See DAPHNE.

OLIVE (Wild). In botany. See ELÆAGNUS.

OLIVE (Wild), of Barbadoes. See BONTIA.

OLIVER (Isaac), an excellent English painter, born in 1556, eminent both for history and portraits. Several fine miniatures of this master are to be seen in the collections of our nobility and gentry; some of them portraits of himself. As he was a very good designer, his drawings are finished to an extraordinary degree of perfection; many being copies after Parmegiano. Rubens and Vandyck painted James I. after a miniature of Oliver's, which is a sufficient testimony of his merit. He died in 1617.

OLIVER (Peter), the son and disciple of Isaac Oliver, was born in 1601. He arrived at a degree of perfection in miniature portraits confessedly superior to his father, or any of his cotemporaries, as he did not confine his subjects to a head only. In the collections of Charles I. and James II. there were thirteen historical subjects painted by this Oliver; of which seven are still preserved in the closet of queen Caroline at Kensington; and a capital painting of his wife is in the possession of the duchess of Portland. He died in 1660.

OLIVET, or, MOUNT OF OLIVES, was situated to the east of the city of Jerusalem, and parted from the city only by the brook Kidron, and by the valley of Jehoshaphat, which stretches out from the north to the south. It was upon this mount that Solomon built temples to the gods of the Ammonites (1 Kings xi. 7.) and of the Moabites, out of complaisance to his wives, who were natives of these nations. Hence it is that the Mount of Olives is called the mountain of corruption (2 Kings xxiii. 13.). Josephus says, that this mountain is at the distance of five stadia, or furlongs, from Jerusalem, which make 625 geometrical paces, or the length of a Sabbath-day's journey, says St. Luke, (Acts i. 12). The Mount of Olives had three summits, or was composed of three several mountains, ranged one after another from north to south. The middle summit is that from whence our Saviour ascended into heaven. It was upon that towards the south that Solomon built temples to his idols. The summit which is most to the north is distant two furlongs from the middlemost. This is the highest of the three, and is commonly called Galilee.

OLIVET (Joseph), a jesuit of Salins, known for his learned editions of Cicero's works printed at Paris, and then at Geneva, 9 vols. 4to. He published besides, translations of some of the orations of Demosthenes and Cicero, and of Cicero's treatise de Nat. D. and other works. He was member of the French academy, and died 1768.

OLIVEYRA (Chevalier Francis de), a Portuguese, employed in various embassies. Abandoning the popish tenets, he retired to Holland, and afterwards to England, where he lived in learned ease. He published in French, "a pathetic discourse, addressed to his countrymen," in consequence of the earthquake of Lisbon. He died 1783, aged 83.

OLIVINE. See OLIVINUS.

OLIVINUS, in mineralogy, a genus of the class earths, order siliceous: consisting of the greater part silica and a smaller proportion of alumina, and oxyd of iron; found in basalts shining internally, generally of a common form, hard, mouldering in the air; melting with difficulty. Four species.

1. O. Werneri. Olivine; olive chrysolite. Tinged, diaphonous, of a conchaceous texture, breaking into indeterminate fragments. Found in Arthur's seat near Edinburgh, in France, Germany, and most parts of Europe, imbedded in basalts; sometimes in the form of grains, sometimes in large pieces; colour olive, or yellowish-green, and when withered, brownish or ochre-yellow; is attacked by digestion in nitric acid, and its ferruginous parts are taken up: specific gravity from 2,960 to 3,225.

2. O. vitreus. Hyalite. Muller's glass. Pellucid, pure white, of a glassy texture; breaking into indeterminate fragments, with the surfaces spherically convex. Found in Germany, Hanover, and Frankfort, in rocks of trap or serpentine, and occurs in the form of grains, filaments, or rhomboidal masses; texture foliated; fracture inclining to rhomboidal; generally transparent, rarely opaque: is infusi-

ble at 150 of Wedgewood, but yields to soda: specific gravity 2,110: contains

Silica	57
Alumina	18
Lime	15
Iron	10
	100

Link.

3. O. spatosus. Bastard feldspar. Diaphonous, white, of a foliated texture, breaking into rhomboidal fragments. Found in Gottingen in basalts, and in Mount Mendenburg on the Rhine; resembles feldspar, but is harder, and much more difficult of fusion.

4. O. fibrosus. Diaphonous, white, fibrous, hard, shining. Found on the banks of the Rhine, near Unkal, imbedded in basalt, and is very brittle.

OLMUTZ, the capital of Moravia, and an archbishop's see, with a famous university, and a strong castle, used as a state prison. It is fortified, well built, and entirely surrounded by the river Morau. This city was taken, in 1741, by the king of Prussia; and in 1758 he attempted it again, but was obliged to raise the siege. The emperors of Russia and Austria met here in 1805, previous to the battle of Austerlitz. It is 80 miles N. by E. of Vienna, and 97 S. of Breslau. Lon. 17. 15 E. Lat. 49. 33 N.

OLNEY, a town in Buckinghamshire, with a market on Monday, and a manufacture of bonelace; seated on the Ouse, 12 miles S.E. of Northampton, and 55 N.N.W. of London.

OLONETZ, a government of Russia, included formerly in the government of Novogorod. In this district are mines of copper and iron. The capital is of the same name, and near it is a mineral spring and an iron forge. It is situate on the river Olonza, near its entrance into the lake Ladoga, 100 miles, cross the lake, N E. of Petersburg. Lon. 34. 20 E. Lat. 61. 26 N.

OLONETZ MOUNTAINS, a chain of mountains in the N.W. part of Russia, which runs in a direction almost due N. for the space of 1000 miles, forming part of the boundary between this country and Sweden.

OLONNOIS (John David), of Olonne, is famous for his bold adventures in the 17th century. He passed early into America, and joined the Buccaneers in St. Domingo. After spreading devastation on the coasts of the Spanish settlements, he was at last attacked by the Indians, who cut his body to pieces and devoured it.

OLYMPIA (orum), celebrated games which received their name either from Olympia, where they were observed, or from Jupiter Olympius, to whom they were dedicated. The opinion most generally received is, that they were first established by Hercules in honour of Jupiter Olympius, after a victory obtained over Augias, B.C. 1222. But they were neglected after their first institution by Hercules, and Iphitus, in the age of the lawgiver of Sparta, renewed them. This re-institution, which happened B.C. 884, forms a celebrated epoch in Grecian history, and is the beginning of the Olympiads. (See OLYMPIAS.) They, however, were neglected for some time after the age of Iphitus, till Corœbus, who obtained a victory B.C. 776, re-instituted them to be regularly and constantly celebrated. The care and superintendance of the games were intrusted to the people of Elis, till they were excluded by the Pisæans, B.C. 364, after the destruction of Pisa. The presidents of the games were obliged solemnly to swear, that they would act impartially, and not take any bribes, or discover why they rejected some of the combatants. They generally sat naked, and held before them the crown which was prepared for the conqueror. There were also certain officers to keep good order and regularity, called αλυται. No women were permitted to appear at the celebration of the Olympian games. This rule, however, was sometimes neglected. The preparations for these festivals were great. No person was permitted to enter the lists if he had not regularly exercised himself ten months before the celebration at the public gymnasium of Elis. The wrestlers were appointed by lot. In these games were exhibited running, leaping, wrestling, boxing, and the throwing of the quoit, which was called altogether πενταθλον, or quinquertium. Besides these, there were horse and chariot races, and also contentions in poetry, eloquence, and the fine arts. The only reward that the conqueror obtained was a crown of olive. So trifling a reward stimulated courage and virtue, and was more the source of great honours than the most unbounded treasures. The statues of the conquerors, called Olympionicæ, were erected at Olympia, in the sacred wood of Jupiter. Their return home was that of a warlike conqueror; they were drawn in a chariot by four horses, and every where received with the greatest acclamations. Painters and poets were employed in celebrating their names. The combatants were naked. The Olympic games were observed every fifth year, or rather at the expiration of four years; they continued for five successive days, and drew together, not only the inhabitants of Greece, but of the neighbouring islands and countries.—2. A town of Elis, in Peloponnesus, where Jupiter had a temple with a celebrated statue 50 cubits high, reckoned one of the seven wonders of the world. The Olympic games were celebrated in the neighbourhood.

OLYMPIAS, a certain space of time which elapsed between the celebration of the Olympic games. The Olympic games were celebrated after the expiration of four complete years, whence some have said that they were observed every fifth year. This period of time was called Olympiad, and became a celebrated era among the Greeks, who computed their time by it; but the custom of reckoning by the celebration of the Olympic games was not introduced at the first institution of these festivals, but to speak accurately, only the

year in which Corœbus obtained the prize. This Olympiad, which has always been reckoned the first, fell, according to the accurate and learned computations of some of the moderns, exactly 776 years before the christian era, in the year of the Julian period 3038, and 23 years before the building of Rome. The computations by Olympiads ceased, as some suppose, after the 364th, in the year 440 of the christian era. To the Olympiads history is much indebted, as they have served to fix the time of many momentous events.

OLYMPIAS, a celebrated woman, who was daughter of a king of Epirus, and who married Philip, king of Macedonia, by whom she had Alexander the Great. Her haughtiness obliged Philip to repudiate her. Olympias was sensible of this injury, who, it is said, caused Philip to be murdered. At the death of Alexander, she seized the government of Macedonia, and cruelly put to death Aridæus and his wife Euridice, also Licanor, the brother of Cassander, with 100 leading men of Macedon, who were inimical to her interest. Such barbarities did not long remain unpunished: Cassander besieged her in Pydna, and obliged her to surrender after an obstinate siege. She was at last massacred by those whom she had cruelly deprived of their children, about 316 years before the Christian era.

OLYMPIC GAMES. See OLYMPIA.

OLYMPIUS, a surname of Jupiter at Olympia, where the god had a celebrated temple and statue, which passed for one of the seven wonders of the world. It was the work of Phidias.

OLYMPUS, a name common to several mountains in Asia and Europe; the most remarkable of which is that of Macedonia and Thessaly. The ancients supposed that it touched the heavens with its top; and, from that circumstance, they have placed the residence of the gods there, and have made it the court of Jupiter. It is about one mile and a half in perpendicular height, and is covered with pleasant woods, caves, and grottos. On the top of the mountain, according to the notions of the poets, there was no wind, no rain, no clouds, but an eternal spring.—This name is common also to some persons, but of no considerable note.

OLYNTHUS, a celebrated town and republic of Macedonia, on the isthmus of the peninsula of Pallene. It became famous for its flourishing situation, and for its frequent disputes with the Athenians, Lacedæmonians, and king Philip.

OLYRA, in botany, a genus of the class monoecia, order diandria. Male: calyx, a one-flowered glume, awned; corolless. Female: a one-flowered glume, spreading, ovate; style cloven; seeds cartilaginous. Two species, herbs of Jamaica.

OMALYSSUS, in the entomology of Fabricius, a tribe of the coleopterous genus LAMPYRIS, which see.

OMAN, a province of Arabia, bounded on the N. by the Persian Gulf, on the E. by the ocean, and on the S. and W. by extensive deserts. It is possessed by a number of petty sovereigns, the most considerable of whom is the imam of Oman, the capital of the province, which is situate 60 miles N.W. of Mascat. Lon. 57. 20 E. Lat. 24. 0 N.

OMAGH, a town of Ireland, in the county of Tyrone, where the assizes are held. It is 20 miles N.E. of Inniskilling.

OMAR I. second caliph after Mahomet, began to reign 634. After defeating Ali, whom Mahomet had appointed his successor, he spread his conquests over Syria and Phœnicia, and took Jerusalem after an obstinate siege. His generals extended his conquests over Persia and Egypt, and increased the worshippers of Mahomet. The fall of Alexandria under his power was marked by the destruction of its celebrated library, but he restored the canal of communication between the Nile and the Red Sea. He was stabbed at Jerusalem, by a Persian slave, 644, in his 63d year. During his reign the Mahometans conquered 36,000 towns, destroyed 4000 Christian temples, and built 1400 mosques. Omar was a great warrior, in his manners austere and virtuous; and regarding merit as the only title to superiority, he declared the crown elective; and placed his son in an inferior situation.

OMAR II. 13th caliph of the Ommiades, succeeded Solyman, 717. He laid siege to Constantinople, but his attempts to take it failed; and the destruction of his fleet by a terrible tempest obliged him to retire from the walls. He was assassinated at Edessa, 720, by his own family.

OMBI, a city of ancient Egypt, afterwards called Arsinoe and Crocodilopolis, was the capital of one of the nomes into which that country was divided, and is remarkable, in the annals of idolatry, for the hatred of its inhabitants to the religion of their neighbours, the citizens of Tentyra.

That brutes were worshipped in Egypt is universally known: and Diodorous the Sicilian informs us, in a passage quoted by Eusebius, that "the cities and nomes of Egypt being at one time prone to rebellion, and to enter into conspiracies against monarchical government, one of their most politic kings contrived to introduce into the neighbouring nomes the worship of different animals; so that while each reverenced the deity which itself held sacred, and despised that which its neighbours had consecrated, they could hardly be brought to join cordially in one common design to the disturbance of the government."

In this distribution of gods he conferred upon Ombi the crocodile, and upon Tentyra the mortal enemy of that monster, the ichneumon. The consequence of which was, that while the Ombites worshipped the crocodile, the Tentyrites took every opportunity of slaughtering him, insomuch that, according to Strabo, the very voice of an inhabitant of Tentyra put the crocodile to flight. This, we confess, is a very improbable fact; but it is certain that the mutual hatred of those cities,

on account of their hostile gods, rose to such a height, that whenever the inhabitants of the one were engaged in the more solemn rites of their religion, those of the other were sure to embrace the opportunity of setting fire to their houses, and rendering them every injury in their power to inflict. And what may, to a superficial thinker, appear extraordinary, though it will excite no wonder in the breast of him who has studied mankind, this animosity continued between the inhabitants of the two cities long after the crocodile and ichneumon had lost their divinity.

OMBRE, a celebrated game at cards, borrowed from the Spaniards, and played by two, by three, or by five persons, but generally by three. When three play at this game, nine cards are dealt to each party; the whole ombre pack being only 40; because the eights, nines, and tens are thrown out of the pack. There are two sorts of counters for stakes, the greater and the lesser; the last having the same proportion to the other as a penny to a shilling: of the greater counters each man stakes one for the game; and one of the lesser for passing for the hand, when eldest, and for every card taken in. As to the order and value of the cards, the ace of spades, called spadillo, is always the highest trump, in whatsoever suit the trump be; the manille, or black deuce, is the second; and the basto, or ace of clubs, is always the third: the next in order is the king, the queen, the knave, the seven, the six, the five, four, and three. Of the black there are 11 trumps; of the red, 12. The least small cards of the red are always the best, and the most of the black; except the deuce and red seven, both of which are called the manilles, and are always second when the red is a trump. The red ace, when a trump, enters into the fourth place, and is called punto, otherwise it is only called an ace. The three principal cards are called matadores; which have this privilege, that they are not obliged to attend an inferior trump when it leads; but for want of a small trump, the person may renounce trumps, and play any other card; and when these are all in the same hand, the others pay three of the greater counters a-piece; and with these three for a foundation, he may count as many matadores as he has cards in an uninterrupted series of trumps; for all which the others are to pay one counter a-piece. He who hath the first hand is called ombre, and has his choice of playing the game, of naming the trump, and of taking in as many and as few cards as he pleases; and after him the second, &c. But if he does not name the trump before he looks on the cards he has taken in, any other may prevent him, by naming what trump he pleases. He that has the first hand should neither take in, nor play, unless he has at least three sure tricks in his hand: for, as he wins the game who wins most tricks, he that can win five of the nine has a sure game; which is also the case if he wins four, and can so divide the tricks as that one person may win two, and the other three.

If a person plays without discarding or changing any cards, this is called playing sans prendre; and if another wins more tricks than he, he is said to win codille. The oversights in the course of the game are called beasts. And if the ombre wins all the nine tricks, it is called winning the vole.

In ombre by five, which many, on account of its not requiring so close an attention, prefer to that by three, only eight cards a-piece are dealt; and five tricks must be won, otherwise the ombre is beasted. Here the person who undertakes the game, after naming the trump, calls a king to his assistance; upon which the person in whose hand the king is, without discovering himself, is to assist him as a partner, and to share his fate. If, between both, they can make five tricks, the ombre wins two counters, and the auxiliary king only one; but when the counters are even, they divide them equally. If the ombre venture the game without calling in any king, this too is called playing sans prendre; in which case the other four are all against him, and he must win five tricks alone, or be beasted. The rest is much the same as by three.

OMBROMETER. See PLUVIAMETER.

O'MEGA. *s.* (ὠμέγα.) The last letter of the alphabet, therefore taken in the Holy Scripture for the last (*Revelation*).

O'MELET. *s.* (*omelette*, Fr.) A kind of pancake made with eggs.

O'MEN. *s.* (*omen*, Latin.) A sign good or bad: a prognostic (*Dryden*).

O'MENED. *a.* (from *omen*.) Containing prognostics (*Pope*).

OMENTITIS. (from *omentum*, the caul.) Inflammation of the omentum, a species of peritonitis.

OMENTUM. (from *omen*, a guess; so called because the soothsayers prophesied from an inspection of this part.) Epiploon. The caul. An adipose membranous viscus of the abdomen, that is attached to the stomach, and lies on the anterior surface of the intestines. It is thin and easily torn, being formed of a duplicature of the peritoneum, with more or less of fat interposed. It is distinguished into the great omentum and the little omentum.

The great omentum, which is also termed gastrocolicum, arises from the whole of the great curvature of the stomach, even as far as the spleen, from whence it descends loosely behind the abdominal parietes, and over the intestines to the navel, and sometimes into the pelvis. Having descended thus far, its inferior margin turns inwards and ascends again, and is fastened to the colon and the spleen, where its vessels enter.

The small omentum, or hepaticogastricum, arises posteriorly from the transverse fissure of the liver. It is composed of a duplicature of peritoneum, passes over the duodenum and small lobe of the liver; it also passes by the lobulus spigelii and pancreas, proceeds into the colon and small curvature of the stomach, and is implanted ligamentous into the œsophagus. It is in this omentum that Winslow

discovered a natural opening, which goes by his name. If air be blown in at the foramen of Winslow, which is always found behind the lobulus spigelii, between the right side of the liver and hepatic vessels, the vena portarum and duodenum, the cavity of the omentum, and all its sacs may be distended.

The omentum is always double, and between its lamellæ closely connected by very tender cellular substance, the vessels are distributed and the fat collected. Where the top of the right kidney, and the lobulus spigelius of the liver, with the subjacent large vessels, form an angle with the duodenum, there the external membrane of the colon, which comes from the peritoneum joining with the membrane of the duodenum, which also arises immediately from the peritoneum lying upon the kidney, enters back into the transverse fissure of the liver for a considerable space, is continuous with its external coat, contains the gall-bladder, supports the hepatic vessels, and is very yellow and slippery. Behind this membranous production, betwixt the right lobe of the liver, hepatic vessels, vena portarum, biliary ducts, aorta, and adjacent duodenum, there is the natural opening just mentioned, by which air may be blown extensively into all the cavity of the omentum. From thence, in a course continuous with this membrane from the pylorus and the smaller curvature of the stomach, the external membrane of the liver joins in such a manner with that of the stomach, that the thin membrane of the liver is continued out of the fossa of the venal duct across the little lobe into the stomach stretched before the lobe and before the pancreas. This little omentum, or hepatico-gastricum, when inflated, resembles a cone, and gradually becoming harder and emaciated, it changes into a true ligament, by which the œsophagus is connected to the diaphragm. But the larger omentum, the gastrocalicum, is of a much greater extent. It begins at the first accession of the right gastroepiploic artery to the stomach, being continued there from the upper plate of the transverse mesocolon; and then from the whole great curve of the stomach, as far as the spleen, and also from the right convex end of the stomach towards the spleen, until it also terminates in a ligament, that ties the upper and back part of the spleen to the stomach: this is the anterior lamina. Being continued downward, sometimes to the navel, sometimes to the pelvis, it hangs before the intestines, and behind the muscles of the abdomen, until its lower edge being reflected upon itself, ascends, leaving an intermediate vacuity between it and the anterior lamina, and is continued to a very great extent into the external membrane of the transverse colon, and lastly, into the sinus of the spleen, by which the large blood vessels are received, and it ends finally on the œsophagus, under the diaphragm. Behind the stomach, and before the pancreas, its cavity is continuous with that of the smaller omentum. To this the omentum colicum is connected, which arises farther to the right than the first origin of the omentum gastrocolicum from the mesocolon, with the cavity of which it is continuous, but produced solely from the colon and its external membrane, which departs double from the intestine; it is prolonged, and terminates by a conical extremity, sometimes of longer, sometimes of shorter extent, above the intestinum cæcum. For all the blood which returns from the omentum and mesocolon goes into the vena portarum, and by that into the liver itself. The omentum gastrocolicum is furnished with blood from each of the gastroepiploic arteries, by many descending articulated branches, of which the most lateral are the longest, and the lowest anastomose by minute twigs with those of the colon. It also has branches from the splenic, duodenal, and adipose arteries. The omentum colicum has its arteries from the colon, as also the smaller appendices, and also from the duodenal and right epiploic. The arteries of the small omentum come from the hepatics, and from the right and left coronaries. The omentum being fat and indolent, has very small nerves. They arise from the nerves of the eight pair, both in the greater and lesser curvatures of the stomach. The arteries of the mesentery are in general the same with those which go to the intestine, and of which the smaller branches remain in the glands and fat of the mesentery. Various small accessory arteries go to both mesocolons from the intercostals, spermatics, lumbars, and capsulary, to the transverse portion from the splenic artery and pancreato-duodenalis, and to the left mesocolon, from the branches of the aorta going to the lumbar glands. The veins of the omentum, in general, accompany the arteries, and unite into similar trunks; those of the left part of the gastrocolic omentum into the splenic, and also those of the hepatigastric, which likewise sends its blood to the trunk of the vena portarum: those from the larger and right part of the gastrocolic omentum, from the omentum colicum, and from the appendices epiploides, into the mesenteric trunk. All the veins of the mesentery meet together in one trunk in the true trunk of the large vena portarum, being collected first into two large branches, of which the one, the mesenteric, receives the gastroepiploic vein, the colicæ mediæ, the iliocolica, and all those of the small intestines as far as the duodenum; the other, which going transversely inserts itself into the former, above the origin of the duodenum, carries back the blood of the left gastric veins, and those of the rectum, except the lowermost, which belongs partly to those of the bladder, and partly to the hypogastric branches of the pelvis. The vein which is called hæmorrhoidalis interna is sometimes inserted rather into the splenic than into the mesenteric vein. Has the omentum also lymphatic vessels? Certainly there are conglobate glands, both in the little omentum and in the gastrocolicum; and ancient anatomists have observed pellucid vessels in the omentum; and a modern has described them

for lacteals of the stomach. See ANATOMY.

OMENTUM GASTRO-COLICUM. In myology. See OMENTUM.

OMENTUM HEPATICO-GASTRICUM. See OMENTUM.

OMER (St.), a fortified, large, and populous town of France, in the department of the Straits of Calais. It was anciently a village, called Sithieu, and owes its present name and importance to a saint, who built a monastery here in the seventh century. The principal church, and that of St. Bertin, are magnificent, as is the late abbey of that saint. In 1677, it was taken by the French, and confirmed to them by the treaty of Nimeguen. About a league from St. Omer, is a great morass, in which are some floating islands, that may be directed at pleasure, nearly like a boat. They produce good pasture; and the trees that grow upon them are kept low, that the wind may not have too much power over them. St. Omer is seated on the Aa, on the side of a hill, eight miles N.W. of Aire, and 135 N. of Paris. Lon. 2. 20 E. Lat. 54. 45 N.

O'MER. *s.* A Hebrew measure about three pints and a half English (*Bailey*).

To O'MINATE. *v. a.* (*ominor*, Lat.) To foretoken; to show prognostics (*Decay of Piety*).

OMINA'TION. *s.* (from *ominor*, Latin.) Prognostic (*Brown*).

O'MINOUS. *a.* (from *omen.*) 1. Exhibiting bad tokens of futurity; foreshowing ill; inauspicious (*Hayward*). 2. Exhibiting tokens good or ill (*Bacon*).

O'MINOUSLY. *ad.* (from *ominous.*) With good or bad omen.

O'MINOUSNESS. *s.* (from *ominous.*) The quality of being ominous.

OMI'SSION. *s.* (*omissus*, Latin.) 1. Neglect to do something; forbearance of something to be done (*Rogers*). 2. Neglect of duty, opposed to commission or perpetration of crimes (*Shakspeare*).

To OMI'T. *v. a.* (*omitto*, Latin.) 1. To leave out; not to mention (*Bacon*). 2. To neglect to practise (*Addison*).

OMI'TTANCE. *s.* (from *omit.*) Forbearance: not in use (*Shakspeare*).

OMMENBURG, a strong town of Germany, in the electorate of Mentz, seated on the Othern, nine miles S.E. of Marpurg, and 45 N.E. of Francfort. Lon. 9. 13 E. Lat. 50. 30 N.

OMMIRABIH, a river of Africa, which rises in Mount Atlas, separates the kingdom of Morocco from that of Fez, and entering the Atlantic, forms a capacious bay on the E. side of Azamor.

OMNES. (Lat.) All, or all together. A word sometimes used in the old music intead of tutti. See TUTTI.

OMNIFA'RIOUS. *a.* (*omnifarium*, Latin.) Of all varieties or kinds (*Philips*).

OMNI'FEROUS. *a.* (*omnis* and *fero*, Lat.) All-bearing.

OMNI'FIC. *a.* (*omnis* and *facio*, Latin.) All-creating (*Milton*).

OM'NIFORM. *a.* (*omnis* and *forma*, Lat.) Having every shape.

OMNI'GENOUS. *a.* (*omnigenus*, Latin.) Consisting of all kinds.

OMNIPA'RITY. *s.* (*omnis* and *par*, Lat.) General equality (*White*).

OMNI'POTENCE. OMNI'POTENCY. *s.* (*omnipotentia*, Latin.) Almighty power; unlimited power (*Tillotson*).

OMNI'POTENT. *a.* (*omnipotens*, Latin.) Almighty; powerful without limit (*Grew*).

OMNIPRE'SENCE. *s.* (*omnis* and *præsens*, Latin.) Ubiquity; unbounded presence.

OMNIPRE'SENT. *a.* (*omnis* and *præsens*, Latin.) Ubiquitary; present in every place.

OMNI'SCIENCE. OMNI'SCIENCY. *s.* (*omnis* and *scientia*, Latin.) Boundless knowledge; infinite wisdom (*King Charles*).

OMNI'SCIENT. *a.* (*omnis* and *scio*, Lat.) Infinitely wise; knowing without bounds.

OMNI'SCIOUS. *a.* (*omnis* and *scio*, Latin.) All-knowing: not in use (*Hakewill*).

OMNIUM, a term in use among stock-jobbers to express all the articles included in the contract between government and the original subscribers to a loan, which of late years has generally consisted of different proportions of 3 and 4 per cent. stock, with a certain quantity of terminable annuities. Those who dispose of their share soon after the agreement is concluded generally get a premium of 2 or 3 per cent. for it, which fluctuates with the current prices of the public funds; and in a few instances the omnium has been at a considerable discount. Some of the subscribers pay their whole subscription at the time fixed for the first or second payment, and their shares become immediately transferable stock: others dispose of the several articles which make up the terms of the loan, separately; and in this state the 3 or 4 per cent. consols, &c. are distinguished by the name of scrip, till the whole sum has been paid in upon them.

OMNI'VOROUS. *a.* (*omnis* and *voro*, Lat.) All-devouring.

OMO, in myology. Names compounded with this word belong to muscles which are attached to the scapula: from ωμος, the shoulder. As,

OMO-HYOIDEUS. Coraco-hyoideus of Albinus and Douglas. A muscle situated between the os hyoides and shoulder, that pulls the os hyoides obliquely downwards. It arises broad, thin, and fleshy from the superior costa of the scapula, near the semilunar notch, and from the ligament that runs across it; thence ascending obliquely, it becomes tendinous below the sternocleido-mastoideus, and growing fleshy again, is inserted into the base of the os hyoides.

OMOPLATA. (ωμοπλατη; from ωμος, the shoulder, and πλατυς, broad.) See SCAPULA.

OMOS. (ωμος.) In anatomy, the shoulder.

OMPHALE, a queen of Lydia, daughter of Jardanus. She married Tmolus, who, at his death, left her mistress of his kingdom. She purchased Hercules, who had been sold as a slave for the recovery of his senses after the

murder of Eurytus. Omphale soon restored her slave to liberty, and the hero became enamoured of his mistress. The queen favoured his passion, and had a son by him. Hercules is represented by the poets as so desperately enamoured of the queen, that, to conciliate her esteem, he spins by her side among her women, while she covers herself with the lion's skin, and arms herself with the club of the hero, and often strikes him with her sandals for the uncouth manner with which he holds the distaff, &c. Their fondness was mutual.

OMPHALEA, in botany, a genus of the class monoecia, order monadelphia. Male: calyx four-leaved; corolless; filament columnar, with the anthers inserted into it. Female: calyx five-leaved; corolless; stigma three-cleft; capsule fleshy, three-celled; nuts solitary. Four species, Jamaica shrubs.

OMPHALOCELE. (ομφαλοκηλη; from ομφαλος, the navel, and κηλη, a tumour.) An umbilical hernia. See HERNIA.

OMPHALO'PTIC. *s.* (ομφαλος and οπτικος.) An optic glass that is convex on both sides, commonly called a convex lens.

OMSK, a town and fortress of Russia, in the government of Tobolsk, situate at the confluence of the Om and Irtish, 260 miles S.E. of Tobolsk. Lon. 74. 54 E. Lat. 55. 4 N.

ON. *prep.* (*aen*, Dutch; *an*, German.) 1. It is put before the word, which signifies that which is under, that by which any thing is supported, which any thing strikes by falling, which any thing covers, or where any thing is fixed (*Milton*). 2. It is put before any thing that is the subject of action: *at work* on *a picture* (*Dryden*). 3. Noting addition or accumulation: as, *mischiefs* on *mischiefs* (*Dry.*). 4. Noting a state of progression: as, *whither* on *thy way?* (*Dryden*). 5. It sometimes notes elevation: *on* a hill, not in a valley (*Dryden*). 6. Noting approach or invasion: *luxury came* on *us* (*Dryden*). 7. Noting dependance or reliance: as, on *God's providence their hopes depend* (*Smalridge*). 8. At, noting place: *the house stands* on *the right hand* (*Shakspeare*). 9. It denotes the motive or occasion of any thing: on *this provocation he grew angry* (*Dryden*). 10. It denotes the time at which any thing happens: as, *this happened* on *the first day*. 11. It is put before the object of some passion: *have pity* on *him* (*Shakspeare*). 12. In forms of denunciation it is put before the thing threatened: *hence* on *thy life*. 13. Noting imprecation: *sorrow* on *you*. 14. Noting invocation: *he called* on *God*. 15. Noting stipulation or condition: *live* on *any terms* (*Dryden*). 16. Noting distinction or opposition: *some were* on *one part, some* on *the other* (*Knolles*). 17. In many senses it is more frequently *upon*.

ON. *ad.* 1. Forward; in succession (*South*). [illegible]ward; in progression (*Daniel*). 3. In [illegible]nce; without ceasing. (*Crashaw*). [illegible] as, *he is neither* on *nor* off; that [illegible]te. 5. Upon the body, as part [illegible]. 6. It notes resolution to [illegible] backward (*Denham*).

ON. *interject.* A word of incitement or encouragement (*Shakspeare*).

ONANDAGO, a lake and river, in the state of New York. The river flows W. from the lake till it meets the Seneca, when its course turns N. to Oswego, where it enters Lake Ontario. It is navigable for boats from its mouth to the head of the lake, except one fall which causes a portage of 20 yards. See ONEIDA.

ONANIA, and ONANISM, terms which some late empirics have framed to denote the crime of self-pollution, mentioned in scripture to have been practised by Onan, and punished in him with death. Some take it for the same with what in other places of scripture, particularly Levit. chap. xx. is called, giving of seed to Moloch; for which the punishment allotted is stoning to death.

This is but ill warranted; the ablest critics make them quite different things. Selden is positive the Jews, in imitation of their neighbours, actually sacrificed their children to Moloch. Others fancy they only made them pass between two fires, in order to obtain the idol's favour and protection.

ONCA and ONCE. See FELIS.

ONCE. *ad.* (from *one.*) 1. One time (*Bacon*). 2. A single time (*Locke*). 3. The same time (*Dryden*). 4. At a point of time indivisible (*Dryden*). 5. One time, though no more (*Dryden*). 6. At the time immediate (*Atterbury*). 7. Formerly; at a former time (*Addison*).

ONCHIDIUM. Onch. In zoology, a genus of the class vermes, order mollusca. Body oblong, creeping, flat beneath; mouth placed before; feelers two, situate above the mouth; arms two at the sides of the head; vent behind and placed beneath. One species only, O. tyhœ. Upper part of the body convex, ash-colour, and covered with irregular glandular tubercles; beneath flat and smooth; head yellowish, small and placed beneath, which when the animal is in motion is perpetually changing its form and size, and drawn in when at rest: mouth placed lengthways, and continually varying its shape from circular to linear; feelers retractile, resembling those of the slug, and apparently tipt with eyes; arms dilatable, solid, compressed, and somewhat palmate when fully expanded. Inhabits Bengal, on the leaves of the typha elephantina; about an inch long and three quarters of an inch broad, but linear and longer when creeping. In appearance it very much resembles a slug, but differs principally in wanting the shield, and lateral pore, and in being furnished with a vent behind.

ONDEGGIARE, or ONDEGGIARE LA MANO. (Ital.) In music, an expression signifying that the hand, when raised in beating time, is to be waved in the air, by way of marking the last part of the measure.

ONE. *a.* (an, œne, Saxon; *een*, Dutch.) 1. Less than two; single; denoted by an unit (*Raleigh*). 2. Indefinitely, any; some one (*Shakspeare*). 3. Different; diverse; opposed

to *another* (*Shakspeare*). 4. One of two: opposed to *the other* (*Smalridge*). 5. Not many; the same (*Pearson*). 6. Particularly one (*Spenser*). 7. Some future (*Davies*).

ONE. *s.* 1. A single person (*Hooker*). 2. A single mass or aggregate (*Blackmore*). 3. The first hour (*Shakspeare*). 4. The same thing (*Locke*). 5. A person, indefinitely (*Watts*). 6. A person, by way of eminence (*Shakspeare*). 7. A distinct or particular person (*Bacon*). 8. Persons united (*Shakspeare*). 9. Concord; agreement; one mind (*Tillotson*) 10. Any person; any man indefinitely (*Atterbury*). 11. A person of particular character (*Shakspeare*). 12. *One* has sometimes a plural, when it stands for persons indefinitely: as, *the great* ones *of the world* (*Glanville*).

ONE-CELLED CAPSULE. In botany, unilocular. As in primula, trientalis, &c.

ONEEHEOW, one of the Sandwich islands, in the N. Pacific Ocean, five leagues W. of Atooi. Its eastern coast is high, and rises abruptly from the sea, but the other parts consist of low ground, except a round bluff head on the S.E. point. It produces plenty of yams, and of the sweet root called tee. Lon. 161. 0 W. Lat. 21. 50 N.

O'NE-EYED. *a.* (*one* and *eye.*) Having only one eye (*Dryden*).

ONE-FLOWERED GLUME. Gluma uniflora. Including one flower only. A one-flowered peduncle. Pedunculus uniflorus; sustaining one flower.

ONEG, a town of Russia, in the government of Archangel, situate on the Onega, near the White Sea, 60 miles S.S.W. of Archangel. Lon. 37. 24 E. Lat. 63. 35 N.

ONEGA, a river and lake of Russia, in the government of Olonetz. It is 100 miles long and 40 broad, and has a communication with lake Ladoga, and consequently with Petersburg. The river gives its name to a country full of woods, and falls into the White Sea.

ONEGLIA, a principality of Italy, surrounded by the territory of Genoa, but subject to the king of Sardinia. It abounds in olive-trees, fruits, and wine.

ONEGLIA, a seaport of Italy, in a principality of the same name. Sardinia, as well as the province, abounds in olive-trees, fruits, and wine. It has been often taken, being an open place; the last time by the French, in 1794. It is seated on a small river, 30 miles S.E. of Cogni, and 60 W. by S. of Genoa. Lon. 7. 51 E. Lat. 43. 58 N.

ONEIDA, or ONONDAGO, a lake of N. America, in the state of New York. It is 20 miles W. of Fort Stanwix, and extends westward about 25 miles, where its outlet, the Onondago river, runs into Lake Ontario, at Oswego. At the E. extremity of the lake is Wood Creek, on the banks of which live a tribe of Indians, called Oneidas; and the Onandagos, another tribe, occupy the country S. of the lake and river.

ONEIROCRITICAL. *a.* (ὀνειροκριτικος, Gr.) Interpretative of dreams (*Addison*).

ONEIROCRITIC. *s.* (ὀνειροκριτικος, Greek.) An interpreter of dreams (*Addison*).

ONEIRODYNIA. (ὀνειροδυνια; from ὀνειρον, a dream, and ὀδυνη, anxiety.) Disturbed imagination during sleep. A genus of disease in the class neuroses, and order vesaniæ of Cullen, containing two species: 1. Oneirodynia activa, walking in the sleep. 2. Oneirodynia gravans, incubus or night-mare. See NIGHT-MARE.

ONE-LEAFED CALYX. Monophyllus. All of one piece.

ONENESS. *s.* (from *one.*) Unity; the quality of being one (*Hammond*).

ONE-PETALLED COROL. Monopetala. All of one piece.

ONE-RANKED, in botony. See SECUNDINE.

O'NERARY. *a.* (*onerarius*, Lat.) Fitted for carriage or burdens; comprising a burden.

To O'NERATE. *v. a.* (*onero*, Latin.) To load; to burden.

ONERATION. *s.* (from *onerate.*) The act of loading.

O'NEROUS. *a.* (*onereux*, Fr. *onerosus*, Lat.) Burdensome; oppressive (*Ayliffe*).

ONE-SEEDED BERRY. See MONOSPERMOUS.

ONE SIDED. Unilateralis. Applied to a raceme which has all the flowers inserted on one side.

ONE-VALVED. Univalvis. In botany, applied to the glume in some grasses; to a spathe opening on one-side; to a pericarp which has the outer shell undivided.

ONGAR, or CHIPPING ONGAR, a town in Essex, with a market on Saturday, 12 miles W. of Chelmsford, and 31 E.N.E. of London. Lon. 0. 16 E. Lat. 51. 43 N.

ONGLEE, or ONGLE, is used by the French heralds to denote the talons or claws of beasts or birds, when of colours different from the body

ONGLEUR. The name formerly given to performers on the lyre, cithara harp, lute, and guitar. Supposed to be derived from the French word *ongle*, a nail, because those instruments have always been played with the nails and ends of the fingers.

ONGOLE, a town of Hindustan, in the Carnatic, seated on a river, not far from its entrance into the bay of Bengal, 150 miles N. by W. of Madras. Lon. 79. 50 E. Lat. 15. 30 N.

ONION, in botany See ALLIUM.

ONION (Sea). See SCYLLA.

ONION TREE. See ALLIUM.

ONISCUS, in zoology, a genus of the class insecta, order aptera. Jaw truncate, denticulate; lip bifid; antennas setaceous, from two to four; body oval, consisting of about fourteen transverse segments; legs fourteen. Forty-three species; divided into the following sections.

A. feelerless; antennas often four, sessile: comprising the tribe cymothoa of Fabricius, and containing thirty-eight species, of which ten are common to our own country.

B. feelers unequal, the hind-ones longer; antennas filiform. Three species, of which two are common to our own country.

Of these insects some, however, are aquatic, others terrestrial: but all feed both on animal and vegetable matter, and cast their skin. We have also observed, already, that in the system of Cuvier and Latreille, the whole genus is removed from its present arrangement, and together with the cancer and monoculus genera, constitutes a new order of animals under the term CRUSTACEA, which see, as also the article ZOOLOGY.

The sea onisci are larger than those of the fresh water, having ten instead of seven segments. Their motions in the water are rapid; for besides the feet, they are assisted by lateral threads, which push them forward like the oars of a boat. Among them, copulation endures for several days; when the male seizes his female with his two fore feet, and drags her along with him wherever he directs his course; and nothing can induce him to leave his female till this fuction is discharged. A few days after impregnation, the female discovers a distended belly; on the seventh, the young issue alive from the womb, and swim around with vigour and alertness. The sea onisci are supposed to be viviparous; those of the land oviparous: the former are generally of a pale red colour for some time after being excluded from the shell.

The following are those chiefly worthy of notice:

1. O. aquaticus. Tail rounded, with forked styles; antennas four. Inhabits England and Europe, generally in stagnant waters; of the general size and colour of the common woodlouse, but longer, and with longer limbs. The young are produced alive, and are contained in a six-cleft follicle.

2. O. entomon. Abdomen naked beneath; tail oblong, acute. The largest insect of the genus, measuring two inches in length; and in its general form resembling the woodlouse. A native of the British and European seas, found about rocks: it preys on small fishes; and will live for several days in fresh water.

3. O. asellus. Woodlouse. This and the ensuing belong to section B in the genus before us. The tail is obtuse, with two simple styles; length rather more than half an inch, colour livid brown; preys on minuter insects: infests England and Europe generally in walls, rotten wood, and under stones. The young are contained in a four-valved follicle, under the abdomen of the mother.

4. O. armadillo. Millepede, or medical woodlouse. Body grey-brown; tail obtuse, entire; segments of the body ten, the edges of which are white: size somewhat longer than that of the preceding, of a much darker colour, and more polished surface; found in similar situations: when suddenly disturbed or handled rolls itself up into a completely globular form, in the manner of the very curious quadruped named *armadillo*, whence its specific denomination. For its medical properties, see MILLEPEDES; as also Nat. Hist. Pl. CLXIII.

ONKELOS, surnamed the Proselyte, a famous rabbi of the first century, and the author of the Chaldee Targum on the Pentateuch He flourished in the time of Jesus Christ, according to the Jewish writers; who all agree that he was, at least in some part of his life, contemporary with Jonathan Ben Uzziel, author of the second Targum upon the prophets. Dean Prideaux thinks he was the elder of the two, for several reasons: the chief of which is the purity of the style in his Targum, therein coming nearest to that part of Daniel and Ezra which is in Chaldee, and is the truest standard of that language, and consequently is the most ancient; since that language, as well as others, was in a constant flux, and continued deviating in every age from the original: nor does there seem to be any reason why Jonathan Ben Uzziel, when he undertook his Targum, should pass over the law, and begin with the prophets, but that he found Onkelos had done this work before him, and with a success which he could not exceed.

Azaries, the author of a book entitled Meor Enaim, or the Light of the Eyes, tells us, that Onkelos was a proselyte in the time of Hillel and Samnai, and lived to see Jonathan Ben Uzziel one of the prime scholars of Hillel. These three doctors flourished 12 years before Christ, according to the chronology of Gauz; who adds, that Onkelos was contemporary with Gamaliel the elder, St. Paul's master, who was the grandson of Hillel, who lived twenty-eight years after Christ, and did not die till eighteen years before the destruction of Jerusalem. However, the same Gauz, by his calculation, places Onkelos 100 years after Christ; and to adjust his opinion with that of Azaries, extends the life of Onkelos to a great length. The Talmudists tell us that he assisted at the funeral of Gamaliel, and was at a prodigious expence to make it most magnificent. Dean Prideaux observes, that the Targum of Onkelos is rather a version than a paraphrase; since it renders the Hebrew text word for word, and for the most part accurately and exactly, and is by much the best of all this sort: and therefore it has always been held in esteem among the Jews, much above all the other Targums; and being set to the same musical notes with the Hebrew text, it is thereby made capable of being read in the same tone with it in their public assemblies.

ONTEOTOMY, in surgery, the opening of a tumour.

O'NLY. *a.* (from *one*, *onely*, or *onelike*.) 1. Single; one and no more (*Dryden*). 2. This and no other (*Locke*). 3. This above all other: as, *he is the* only *man for music*.

O'NLY. *ad.* 1. Simply; singly: merely, barely (*Till.*). 2. So and no otherwise (*Genesis*). 3. Singly without more: as, only *begotten*.

ONOCLEA, in botany, a genus of the

class cryptogamia, order filices. Fructification crowded, occupying the whole back of the divisions of a separate frond; involucre from the membranaceous revolute margin of the frond, generally lacerated, opening towards the rib. Five species; all foreign ferns.

O'NOMANCY. *s.* (ονομα and μαντεια.) Divination by a name (*Camden*).

ONOMA'NTICAL. *a.* (ονομα and μαντις.) Predicting by names (*Camden*).

ONOMATOPŒIA (formed from ονομα, name, and ποιεω, fingo, I feign), in grammar and rhetoric, a figure of speech, whereby names and words are formed, to the resemblance of the sound made by the thing signified.

Thus is the word *trique-trac* formed from the noise made by moving the men at this game: and from the same source arise the buz of bees, the grunting of hogs, the cackling of hens, the snoring of people asleep, the clashing of arms, &c.

The surest etymologies are those deduced from the onomatopœia.

ONONIS. Rest-harrow In botany, a genus of the class diadelphia, order decandria. Calyx five-parted without linear divisions; banner striate; legume turgid, sessile; filaments in one undivided set. Sixty-eight species; of which some have sessile flowers; others flowers on awned peduncles; and others are of uncertain division; these last are all Cape plants. The greater number of every subdivision indeed are Cape plants; the rest, for the most part, indigenous to the south of Europe, or to Asia: two, O. spinosa, and O. nepens, common to our own country; the first to our barren fields, the second to our sea-coasts. The following are the species chiefly cultivated.

1. O. natrix. Yellow-flowered shrubby rest-harrow. A very strong smelling plant, with a resinous odour, and not very clammy: leaves oval, flattish, serrate only at the top, not fleshy; peduncle the length of the awn; root large, wrinkled; stem more or less upright, commonly a foot high; leaflets oblong, toothed at the end, villose; flowers yellow, large, solitary, peduncled; legume oblong and villose. A native of the south of France.

2. O. nidentator. Three-tooth-leaved rest-harrow. Erect shrubby stalks, a foot and half high; leaflets narrow, thick, fleshy on short petioles; flowers at the end of the branches in loose panicles of a fine purple colour, appearing in June: seeds ripening in September. Spain and Portugal.

3. O. fruticosa. Shrubby rest-harrow. A beautiful low shrub, rising with slender branching stalks, two feet high; flowers purple, appearing in May and June. South of France.

4. O. rotundifolia. Round-leaved rest-harrow. Stem round, striated, rather villose, a foot and half high; flowers at the end of the branches, in bunches, and petioled, of a purple colour, appearing in May and June. Switzerland.

These may all be increased by seeds, cuttings, and slips.

ONOPORDON. Cotton-thistle. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle cellular, somewhat chaffy; down capillary; calyx swelling, imbricate, with pungent scales. Ten species; for the most part natives of the south of Europe: but one, O. acanthium, of our own country, found in our wastes, and known in the pharmacopœias by the name of CARDUUS TOMENTOSUS, which article see for its medical virtues.

ONORE, a seaport of Canara, on the coast of Malabar, 110 miles N.N.W. of Mangalore. Lon. 74. 45 E. Lat. 14. 20 N.

ONOSERIS, in botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle nearly naked; down simple; calyx imbricate; corol radiate; corollets of the ray three-toothed. Two species, described by Dr. Smith under the name of atrachylis. Of these one is a native of New Granada, the other of Mexico.

ONOSMA. In botany, a genus of the class pentandria, order monogynia. Corol campanulate, with the throat pervious; seeds four, stigma obtuse. Eight species—chiefly natives of Siberia and the East.

ONRUST, a small island at the mouth of the harbour of Batavia, where the Dutch build and careen their ships.

O'NSET. *s.* (*on* and *set*.) 1. Attack; storm; assault; first brunt (*Addison*). 2. Something added or *set on* by way of ornamental appendage (*Shakspeare*).

To O'NSET. *v. a.* (from the noun.) To set upon; to begin: not used (*Carew*).

O'NSLAUGHT. *s.* (*on* and *slay*.) Attack; storm; onset: not in use (*Hudibras*).

ONTARIO, a lake of North America, situate between 71 and 74° W. lon. and 41 and 45° N. lat. On its S.W. part it receives the waters of Lake Erie (by means of the river Niagara), and near the S.E. the Onondago river; and on the N.E. its waters enter the river Iroquois. It is 600 miles in circumference, and abounds with fish of an excellent flavour, among which are the Oswego bass, weighing three or four pounds.

ONTO'LOGIST. *s.* (from *ontology*.) One who considers the affections of being in general; a metaphysician.

ONTO'LOGY. *s.* (οντα and λογος.) The science of the affections of being in general; metaphysics (*Watts*).

ONUPHRIUS (Panvinius), an Augustine monk of Verona, who continued the lives of the popes, begun by Platina. He published other works, and was so skilled in historical knowledge that he was called the father of history. He died at Palermo, in 1568, aged only thirty-nine.

O'NWARD. *ad.* (onpeard, Saxon.) 1. Forward; progressively (*Pope*). 2. In a state of advanced progression (*Sidney*). 3. Somewhat further (*Milton*).

ONYCHIA. (from ονυξ, the nail.) A whitlow, or paronychia on the side of the finger nail.

ONYCOMANCY, or, as some write it, ONYMANCY; a kind of divination by means of

the nails of the fingers. The word is formed from the Greek ονυξ, nail, and μαντεια, divination. The ancient practice was to rub the nails of a youth with oil and soot, or wax; and to hold up the nails thus smeared against the sun. Upon them were supposed to appear figures or characters, which showed the thing required.

ONYX, in mineralogy, a species of chalcedony. See CHALCEDONIUS.

ONYX. (ονυξ). Unguis. In surgery, an abscess, or collection of pus between the lamella of the cornea; so called from its resemblance to the stone called onyx. The diagnostic signs are, a white spot or speck, prominent, soft, and fluctuating The species are: 1. Abscessus superficialis, arising from inflammation, not dangerous, for it vanishes when the inflammation is resolved by the use of astringent collyria. 2. Abscessus profundus, or a deep abscess, which is deeper seated between the lamellæ of the cornea, sometimes breaking internally, and forming an hypopium: when it opens externally it leaves a fistula upon the cornea; whenever the pus is exsiccated, there remains a leucoma.

OODEADURGAM, a town of the peninsula of Hindustan, which gives name to a pass in the Mysore country. It is 31 miles S.E. of Bangalore, and 73 S. of Seringapatam.

OODOOANULLAH, a town of Hindostan Proper, in Bengal, seated on the W. bank of the Ganges, at the foot of a chain of hills. The situation is esteemed unhealthy, on account of the forests in its vicinity. It was the seat of the government of Bengal, under sultan Sujah, till he fell in the contest for empire with his brother Aurungzebe. The numberless ruins here, and in the neighbourhood, afford a proof of his magnificence; and there still remains a part of the palace, which, in his time, was nearly destroyed by fire. Here is an elegant bridge over the Ganges, built by the same prince, famous for the victory gained over Meer Cossim, in 1764, by major Adams. Oodooanullah is 82 miles N. by W. of Moorshedabad. Lon. 87. 55 E. Lat. 24. 58 N.

OOLITE, in mineralogy. See MARMOR.

OONALASHKA, one of the islands of the Northern Archipelago, visited by captain Cook in his last voyage. The natives appeared to be very peaceable, having been much restrained by the Russians, who now keep them in a state of subjection. As the island furnishes them with subsistence, so it does, in some measure, with clothing, which is chiefly composed of skins. The upper garment, which is made like a waggoner's frock, reaches down to the knees. Besides this, they wear a waistcoat or two, a pair of breeches, a fur cap, and a pair of boots, the legs of which are formed of some kind of strong gut; but the soles and upper leather are of Russia leather. Fish and other sea animals, birds, roots, berries, and even sea-weed, compose their food. They dry quantities of fish during the summer, which they lay up in small huts for their use in winter. They did not appear to be very desirous of iron, nor to want any other instrument except sewing needles, their own being formed of bone. With these they sew their canoes, and make their clothes, and also work very curious embroidery. They use, instead of thread, the fibres of plants, which they split to the thickness required. All sewing is performed by the females, who are shoemakers, tailors, and boat-builders. They manufacture mats, and baskets of grass, which are both strong and beautiful. There is, indeed, a neatness and perfection in most of their works, that shews they are deficient neither in ingenuity nor perseverance. Lon. 165. 0 W. Lat. 53. 5 N.

OOSTBORCH, a town and fort of Dutch Flanders, in the isle of Cadsand, four miles N.E. of Sluys. Lon. 3. 29 E. Lat. 51. 22 N.

OOTATORE, a town of the peninsula of Hindustan, in the Carnatic, 22 miles N W. of Tanjore, and 80 S.W. of Pondicherry. Lon. 78. 57 E. Lat. 11. 2 N.

OOZE. *s.* (*eaux*, waters, French.) 1. Soft mud; mire at the bottom of water; slime (*Carew*). 2. Soft flow; spring (*Prior*). 3. The liquor of a tanner's vat.

To OOZE. *v. n.* (from the noun.) To flow by stealth; to run gently (*Thomson*).

OOZY. *a.* (from *ooze.*) Miry; muddy; slimy (*Pope*).

To OPACATE. *v. a.* (*opaco*, Latin.) To shade; to cloud; to darken (*Boyle*).

OPACITY. *s.* (*opacité*, Fr. *opacitas*, Lat.) Cloudiness; want of transparency (*Newton*).

OPACITY, in philosophy, a quality of bodies which renders them impervious to the rays of light. It has been supposed that opacity consists in this, that the pores of the body are not all straight. This doctrine, however, is deficient: for though to have a body transparent, its pores must be straight, or rather open every way; yet it is inconceivable how it should happen, that not only glass and diamonds, but even water, whose parts are so very moveable, should have all their pores open and pervious every way; while the finest paper, or the thinnest gold leaf, should exclude the light for want of such pores.

So that another cause of opacity must be sought for. Now all bodies have vastly more pores or vacuities than are necessary for an infinite number of rays to pass freely through them in right lines, without striking on any of the parts themselves. For since water is nineteen times lighter or rarer than gold; and yet gold itself is so very rare that magnetic effluvia pass freely through it, without any opposition, and quicksilver is readily received within its pores, and even water itself by compression, it must have more pores than solid parts; consequently water must have at least forty times as much vacuity as solidity. The cause, therefore, why some bodies are opaque, does not consist in the want of rectilinear pores, pervious every way, but either in the unequal density of the parts, or in the magnitude of the pores, and to their being either empty, or filled with a different matter; by means of which the rays of light in their passage are arrested by innumerable

refractions and reflections, till at length falling on some solid part, they become quite extinct, and are utterly absorbed. Hence cork, paper, wood, &c. are opaque; while glass, diamonds, &c. are pellucid. For in the confines or joining of parts alike in density, such as those of glass, water, diamonds, &c. among themselves, no refraction or reflection takes place, because of the equal attraction every way, so that such of the rays of light as enter the first surface pass straight through the body, excepting such as are lost and absorbed, by striking on solid parts: but in the bordering parts of unequal density, such as those of wood and paper, both with regard to themselves, and with regard to the air, or empty space in their larger pores, the attraction being unequal, the reflections and refractions will be very great; and thus the rays will not be able to pass through such bodies, being continually driven about till they become extinct.

That this interruption or discontinuity of parts is the chief cause of opacity, sir Isaac Newton argues, appears from hence, that all opaque bodies immediately begin to be transparent, when their pores become filled with a substance of nearly equal density with their parts. Thus, paper dipped in water or oil, some stones steeped in water, linen cloth dipped in oil or vinegar, &c. become more transparent than before.

OPACOUS. See OPAQUE.

OPAH, in ichthyology. See ZEUS.

OPAL. See OPALUS.

OPALIA, in antiquity, feasts celebrated at Rome in honour of the goddess Ops, on the 14th of the calends of January.

OPALUS. Opal. In mineralogy, a genus of the class earths, order argillaceous. Consisting of alumina, the greater proportion of silica, with a little oxyd of iron, and generally some carbonat of magnesia and carbonat of lime; hardish, shining, hardly ever opake, of a conchoidal texture, light, breaking into indeterminate fragments, parasitical, generally of a common form, easily cracking into clefts; melting with the greatest difficulty. Seven species.

1. O. hydrophanus. Hydrophane. Oculus mundi, achates, agate. Somewhat opake, becoming transparent, and changing its colour in liquids, adhering to the tongue. Found in the Feroe Islands, Iceland, Britanny, Hungary, Silesia and Germany, generally accompanying other stones of the genus, or in the state of incrustation in contact with opal, chalcedony, prase, chrysoprase, serpentine, granite, nephrite, jasper, porphyry, and indurated clay; colour white, red, yellow, or green; becomes gradually transparent when soaked in water by imbibing the fluid; and is sometimes, though rarely, found in the form of a three-sided pyramid: contains

Silex - - - -	93
Alumina - -	2
Water, hydrogen, and air	5
Sometimes a little iron	0
	100 *Kirwan*

2. O. piceus. Pitchstone. Of a waxy lustre, and imperfectly conchoidal texture. Found in amorphous masses of various size, in France, Germany, Saxony, and various parts of Europe, and in New Spain; colour greyish-black, greenish-brown, bluish-grey, leek or olive-green, red or yellowish; transparent, semitransparent or opake, frequently presenting large or small-grained distinct concretions; lustre a little greasy; specific gravity from 2,314 to 2,645: contains

Silex - -	73,00
Alumina - -	14,50
Lime - -	1,00
Oxyd of iron -	1,00
Oxyd of manganese	0,10
Soda - -	1,75
Water - -	8,65
	100 *Klaproth.*

3. O. ligneus. Ligniform opal; woodopal. Nearly opake, breaking longitudinally into fibrous fractures, spontaneous, falling into crustose fragments. Found in Hungary, in large masses, which have the form of wood, of a milk-reddish, or yellowish-white, brown or hyacinth colour; has a shining surface, and is generally semitransparent on the edges; fracture, when broken transversely, conchoidal, when broken longitudinally exhibiting the texture of wood: is very brittle, and, considered as fragments of wood, impregnated with semiopal.

4. O. cereus. Semitransparent, light; of a perfectly conchoidal texture. Found in Poland and Hungary, in rounded fragments, and often imbedded in jasper and indurated clay; colour sometimes waxen, sometimes honey-yellow, frequently verging to brown; brittle, shining very much internally, and breaks into acute and often nearly discoid fragments

5. O. semiopal. Semiopal. Menilites, Hall. Opal, Schmeisser. Hard, lightish, easily breaking into acute fragments. Found in Poland, Bohemia, Hungary, Austria, Saxony, and Germany; colour various, shades of white, grey, yellow, red, brown, often mixed together; diaphonous, or opake, rarely transparent; texture more or less perfectly conchaceous; lustre more or less glassy; is very brittle, and sometimes adheres to the tongue: specific gravity 2,540: contains

Silica -	85,5
Oxyd of iron -	0,5
Water -	11,0
Alumina -	1,0
Lime - -	2,0
	100 *Klaproth.*

6. O. vulgaris. Common opal. Vulgar opal. Nearly pellucid agate. Reflecting a different colour according to its position as to the light, hardish, lightish, diaphonous, breaking into rather obtuse fragments. Found in Poland, Silesia, Saxony, Hungary, and Germany, usually imbedded in other stones, of a common form, rarely kidney-form, or botryoidal, shining a little internally, generally subopake; colour white, yellow, red, green, of various mixtures;

sometimes inclosing a drop of water; reflects a single colour when held between the eye and the light, often cracks, and becomes decomposed by exposure to the atmosphere.

7. O. nobilis. Real opal. Noble opal. Edler opal, Werner. Semitransparent, shining very much internally, light, hardish, reflecting various bright colours according to its position as to light; breaking into acute fragments. Found at the foot of the Carpathian mountains and in Hungary, in solid pieces, and sometimes incorporated in other stones; colour various, the white often reflecting a yellowish, greenish, or reddish effulgence resembling a flame, when placed between the eye and light, the yellow a fiery hue, and the green a purple, red, or yellow; when heated it becomes opake, and is sometimes decomposed by exposure to the atmosphere: specific gravity 2.14: contains

Silica	- -	90
Water	- -	10
		100

OPA'QUE. *a.* (*opacus*, Latin.) Dark; not transparent; cloudy (*Milton*).

OPATRUM. In zoology, a genus of the class insecta, order coleoptera. Antennas moniliform, thicker towards the tip; head projecting from a cavity in the thorax; thorax a little flattened, margined; shells immarginate, longer than the abdomen. Twenty-eight species, scattered over the globe; of which one only, O. sabulosum, brown, having shells with three indented raised lines, is indigenous to our own country; and found on sand. This species is also common to Europe at large and to America.

To OPE. *To* O'PEN. *v. a.* (open, Saxon; *op*, Islandick; ὀπη, Greek, a hole.) 1. To unclose; to unlock: the contrary to *shut* (*Milton. Brown*). 2. To show; to discover (*Abbot*). 3. To divide; to break (*Addison*). 4. To explain; to disclose (*Collier*). 5. To begin (*Dryden*).

To OPE. *To* O'PEN. *v. n.* 1. To unclose itself; not to remain shut (*Dryden*). 2. To bark. A term of hunting (*Dryden*).

OPE. O'PEN. *a.* 1. Unclosed; not shut (*Cleaveland*). 2. Plain; apparent; evident (*Daniel*). 3. Not wearing disguise; clear; artless; sincere (*Addison*). 4. Not clouded; clear (*Pope*). 5. Not hidden; exposed to view (*Locke*). 6. Not precluded; not restrained (*Acts*). 7. Not cloudy; not gloomy (*Bacon*). 8. Uncovered (*Dryden*). 9. Exposed; without defence (*Shaks.*). 10. Attentive (*Psalms*).

OPEN, in music, an epithet applied to the string of a violin, guitar, &c. when not compressed with the finger: i. e. when it produces the very note to which it is tuned. The note so produced is called an open note.

O'PENER. *s.* (from *open.*) 1. One that opens; one that unlocks; one that uncloses (*Milton*). 2 Explainer; interpreter (*Shaks.*). 3. That which separates; disuniter (*Boyle*).

OPENEYED. *a.* (*open* and *eye.*) Vigilant; watchful (*Shakspeare*).

OPENHA'NDED. *a.* (*open* and *hand*). Generous; liberal (*Rowe*).

OPENHEA'RTED. *a.* (*open* and *heart.*) Generous; candid; not meanly subtile (*Dryden*).

OPENHEA'RTEDNESS. *s.* Liberality; frankness; munificence; generosity.

OPENING. *s.* (from *open.*) 1. Aperture; breach (*Woodward*). 2. Discovery at a distance; faint knowledge; dawn (*South*).

O'PENLY. *ad.* (from *open.*) 1. Publicly; not secretly; in sight (*Hooker*). 2. Plainly; apparently; evidently; without disguise (*Dry.*).

OPENMOU'THED. *a.* (*open* and *mouth.*) Greedy; ravenous; clamorous; vociferous (*L'Estrange*).

O'PENNESS. *s.* (from *open.*) 1. Plainness; clearness; freedom from obscurity or ambiguity (*Shakspeare*). 2. Plainness; freedom from disguise (*Felton*).

OPERA, a musical drama, consisting of airs, recitatives, chorusses, &c. enriched with magnificent scenery, machinery, and other decorations, and representing some passionate action. Respecting the origin of the opera, writers are much divided. Some say that we owe its invention to the Venetians, from whom it passed to the French, and afterwards from France to England. Father Menestrier informs us, that it sprung out of the remains of the dramatic music formerly used in the church, and that the Italians first brought it upon the stage about the year 1480. But, notwithstanding these assertions, it is much insisted on that the Opera was invented by Ottavio Rinuccini, a native of Florence, about the year 1600; an opinion strongly countenanced by the author's dedication of his Eurydice to Mary de Medicis, consort of Henry the Fourth of France; in which he says, he had written it "merely to make a trial of the power of vocal music in that form." The structure of the operatical drama was, however, very different at that early period from that representation which now bears the same denomination. No accompaniment of a whole orchestra was then required. The airs performed by the several singers were sustained by instruments of various kinds, assigned to each character respectively in the dramatis personæ, the names of which we find placed against those of the characters in the printed copies, and the whole was much less regular and dramatic than at present. At the beginning of the seventeenth century, an opera was established at Venice, upon the model of which one was also instituted at Paris about the year 1660. Soon after this time, a taste for this species of drama took place in London, and old plays were wrought into the form of operas, and represented at the theatre in Lincoln's-inn-fields. Other imperfect imitations of the Italian opera took place from time to time, in all which the words were English though the music was Italian. At length a regular Italian opera was established at the theatre in the Haymarket, under the denomination of the Royal Academy of Music, which, after a continuance of nine years, broke up. The opera was, however, afterwards resumed, and has maintained itself as an elegant and fascinating species of entertainment to all the lovers of fine dancing and

exquisite music. And the English opera, which owes its existence to that of the Italians, has long proved an attractive vehicle of humour and sentiment, and served to display to great advantage the talents of our best composers and vocal performers.

In questions respecting the fine arts there is no appeal from the general taste; and therefore, as the French opera, which is in the language of the country where it is acted, has always been admired by persons of liberal education, it doubtless has merit considered as a drama; but how the dramas of this kind which are composed in Italian should find admirers in England, among persons who understand not a word of the language, is to us a matter of astonishment. The music of them may deserve and command the admiration of every one who has an ear; and the action of the singers may be perfectly suitable to the subject represented; but of this suitableness the majority of the audience can be no judges.

Even when the language is thoroughly understood, we should imagine, that, to make an opera agreeable to good sense, much would depend upon the choice of the subject; for it is surely absurd to have persons of all ranks, and on every occasion, perpetually accompanied with regular responses of symphony. To hear Cæsar, Scipio, or Macbeth, when forming plans to ensure victory, or hatching plots of treason and murder, talking in recitative and keeping time with fiddles, would surely disgust every person whose sense had not all evaporated in sound; but when the subject represented naturally admits of music in real life, we can suppose an opera to afford to persons of taste one of the most exquisite and refined entertainments of which human nature is capable.

The word opera is also applied by the Italians, and by other nations in imitation of them, to any musical work: and used by composers in conjunction with the ordinal numbers, to distinguish their different publications: as *opera prima*, first work; *opera tertia*, third work, &c.

OPERA-GLASS, in optics, so called from its use in theatres, &c. it is sometimes called a diagonal perspective, from its construction. It consists of a tube about four inches long, in each side of which there is a hole exactly against the middle of a plane mirror which reflects the rays falling upon it, to the convex glass, through which they are retracted to the concave eye-glass, whence they emerge parallel to the eye at the hole in the tube. This instrument is not intended to magnify objects more than about two or three times. The peculiar artifice is to view a person at a small distance, so that no one shall know who is observed: for the instrument points to a different object from that which is viewed; and as there is a hole on each side, it is impossible to know on which hand the object is situated, which you are looking at.

O'PERABLE. *a.* (from *opero*, Latin.) To be done; practicable: not in use (*Brown*).

O'PERANT. *a.* (*operant*, French.) Active; having power to produce any effect (*Shaks.*).

To O'PERATE. *v. n.* (*operor*, Lat.) To act; to have agency; to produce effects (*Atterbury*).

OPERA'TION. *s.* (*operatio*, Latin.) 1. Agency; production of effects; influence (*Hooker*). 2. Action; effect (*Bentley*). 3. (In surgery.) That part of the art of healing which depends on the use of instruments. (See SURGERY.) 4. The motions or employments of an army.

O'PERATIVE. *a.* (from *operate.*) Having the power of acting; having forcible agency; vigorous; efficacious (*Norris*).

OPERA'TOR. *s.* (*operateur*, French; from *operate.*) One that performs any act of the hand; one who produces any effect (*Addison*).

OPERCULARIA. In botany, a genus of the class tetandria, order monogynia Calyx common; corollets from three to five-cleft; capsule united into a common receptacle. Five species, herbs of Australasia.

OPERCULUM. (*operio*, to cover). In botany, a lid or cover to a capsule: as in some mosses, and hyoscyamus. Hence such a capsule is said to be operculate, opercled, or covered with a lid. Some use lidded, which however is not elegant.

OPERO'SE. *a.* (*operosus*, Latin.) Laborious; full of trouble and tediousness (*Burnet*).

OPH, in ichthyology. See OPHIDIUM.

OPHEIM, a town of Norway, in the province of Bergen, 45 miles N.N.E. of Bergen. Lon. 5. 15 E. Lat. 60. 41 N.

OPHIDIUM. In zoology, a genus of the class pisces, order apodalia. Head nakedish; teeth both in the jaws and palate; gill-membrane seven-rayed; body ensiform. Four species, as follow:

1. O. barbatum. Bearded ophidium. Lower jaw with four cirrhi; head small without scales; upper jaw doubled in, and longer than the lower; lips thick, teeth very small; eyes covered with the common skin, pupil black, iris golden, with a transparent, nictitant membrane; tongue smooth, narrow, short; back convex, blueish; lateral line brown; vent nearer the head than the tail; pectoral fins small, brown at the base, and edged with cinereous, the rest joined together, narrow, white, and edged with black; scales irregularly placed and dispersed over the body, sometimes round, sometimes nearly oval, larger near the head, and hardly distinguishable near the tail, adhering to the body by means of a thin transparent skin: colour silvery grey with linear spots; lateral line dusky. Inhabits the Mediterranean and Adriatic seas, and found on our own coast; from twelve to fourteen inches long.

2. O. imberbe. Beardless ophidium. Jaws without cirrhi; tail somewhat blunt. Inhabits European seas, and found on our own coast.

3. O. viride. Green ophidium. Jaws without cirrhi; tail a little pointed. Inhabits the deeper parts of the Greenland seas; is a very rare fish, and occasionally found as large as a whiting; the body long, compressed, green; flesh eatable.

4. O. aculeatum. Prickly ophidium. Jaws acuminate; back with fourteen recurved distinct prickles. Inhabits the fresh waters of

India; from six to eight inches long; feeds on worms and a fat kind of earth; long; esculent.

OPHIOGLOSSUM. Adder's-tongue. In botany, a genus of the class cryptogamia, order filices. Capsule nearly globular, connected into a somewhat jointed two-rowed spike, one-celled, opening transversely; seeds roundish, pulverulent. Six species, all exotics except O. vulgatum; with ovate leaf; indigenous to our meadows and moist pastures. The country people make an ointment of the fresh leaves, and use it as a traumatic to green wounds.

OPHIOMANCY. In antiquity, the art of making predictions from serpents.

OPHIORHIZA. In botany, a genus of the class pentandria, order monogynia. Corol funnel-form; germ cloven; stigmas two; fruit two-lobed. Three species: one a native of the East Indies, one of Otaheite, one of South America.

Of these O. mungos is the only one entitled to attention. It is a specific against the poison of the hooded serpent, and perhaps the cerastes, and is hence called lignum colubrinum.

It is called mungos from the term mungatia given by the Hindus, and mangos by the Portuguese to a species of weasel, that is a mortal enemy to the hooded serpent, that attacks it with incredible fury, and when wounded, flies instinctively to this root, as its antidote. Such at least is the account given by Kœmpfer, who pledges his honour for the truth of it.

OPHIOPHAGOUS. *a.* (οφις and φαγω.) Serpent eating: not used (*Brown*).

OPHIASIS. (from οφις, *a serpent*). In medicine, a falling off of the hair: so called in reference to a serpent's casting its skin annually.

OPHIOXYLUM. In botany, a genus of the class polygamia, order monoecia. Herm. five-cleft; corol five-cleft, funnel-form; stamens five; pistil one; berry double, two-celled; seeds solitary. Male: calyx cloven; corol five-cleft, with a flunnel-form mouth; stamens two. One species; an East Indian shrub with stem erect, round, simple; leaves in fours; flowers terminal.

OPHIR, a country mentioned in scripture, from which Solomon had great quantities of gold brought home in ships which he sent out for that purpose; but where to fix its situation is the great difficulty, authors running into various opinions on that head. Some have gone to the West, others to the East Indies, and the eastern coasts of Africa, in search of it. Mr. Bruce, the celebrated Abyssinian traveller, has displayed much learning and ingenuity in settling this question of biblical history. To the satisfaction of most of his readers, he has determined Ophir to be Sofala, a kingdom of Africa, on the coast of Mosambique, near Zanguebar.

OPHIRA. In botany, a genus of the class octandria, order monogynia. Involucre two-valved, three-flowered; corol four-petalled, superior; berry one-celled, stigma notched. One species: an African shrub, erect; with lateral flowers.

OPHITES. In natural history, a sort of variegated marble, of a dusky green ground, sprinkled with spots of a lighter green, otherwise called serpentine. See the article MARMOR.

OPHITES, in church history, Christian heretics, so called both from the veneration they had for the serpent that tempted Eve, and the worship they paid to a real serpent: they pretended that the serpent was Jesus Christ, and that he taught men the knowledge of good and evil. They distinguished between Jesus and Christ; Jesus, they said, was born of the Virgin, but Christ came down from heaven to be united with him; Jesus was crucified, but Christ had left him to return to heaven. They distinguished the God of the Jews, whom they termed Jaldabaoth, from the supreme God: to the former they ascribed the body, to the latter the soul of men. They had a live serpent, which they kept in a kind of cage; at certain times they opened the cage door, and called the serpent: the animal came out, and, mounting upon the table, twined itself about some loaves of bread; this bread they broke, and distributed it to the company, who all kissed the serpent: this they called their eucharist.

OPHRYS. Tway-blade. In botany, a genus of the glass gynandria, order diandria. Nectary a deflected lip, slightly carinate underneath. Thirty-three species, some few with branched bulbs, but the greater number with round bulbs. Chiefly Cape-plants; but ten common to the woods, pastures, spongy heaths, or marshes of our own country.

The cultivated species are the following:

1. O. ovata. Common ophrys or tway-blade, with numerous flowers of a fragrant musky scent, in a loose spike, four inches long, yellowish-green.

2. O. spiralis. Spiral ophrys; triple lady's traces. Bulbs clustered, oblong; stem somewhat leafy; flowers spirally pointing one way; lip undivided, crenulate.

3. O. nidus avis. Bird's-nest ophrys, with loose spikes of herbaceous flowers resembling gnats, composed of five petals, with a long bifid lip to the nectarium; a crest or standard above, and two wings on the side.

4. O. musifera. Fly ophrys: with flowers in a long thinly scattered spike; generally four or five in number, but sometimes as many as fifteen. It bears a near resemblance to a fly, whence its specific name.

5. O. apifera. Bee ophrys. Bractes longer than the germ, lanceolate; the three outer petals large, spreading, purple, with the keel and two nerves green: the two inner petals very small, hairy, reflex green; the lower lip of the nectary large, wide, but shorter than the petals.

6. O. anthropophora. Man ophrys, with numerous flowers on a long loose spike: the lip of the nectary so divided as to bear a coarse resemblance to human arms and legs, whence its specific name.

All these afford variety, and are highly ornamental in the clumps, borders and other parts of shrubberies. They are propagated by any of the common modes.

OPHTHALMIA. (οφθαλμια; from οφθαλμος, the eye). An inflammation of the membranes of the eye, or of the whole bulb of the eye, distinguishable by redness, heat, pain, and tension of the parts, accompanied with intolerance of light, and effusion of tears. It is a genus of disease in the class pyrexiæ, and order phlegmasiæ of Cullen; and comprehends two species: 1. Ophthalmia membranarum, inflammation of the coats of the eye. 2. Ophthalmia tarsi, in which small ulcers are seen of the sebaceous glands of the tarsus, discharging a glutinous matter.

OPHTHALMIC GANGLION. In anatomy. Ganglion ophthalmicum. Lenticular ganglion. This ganglion is formed in the orbit, by the union of a branch of the third or fourth pair with the first branch of the fifth pair of nerves.

OPHTHALMIC NERVE. Nervus ophthalmicus. Orbital nerve. The first branch of the ganglion or expansion of the fifth pair of nerves. It is from this nerve that a branch is given off, to form, with a branch of the sixth, the great intercostal nerve.

OPHTHALMODYNIA. (οφθαλμοδυνια; from οφθαλμος, an eye, and οδυνη, pain.) A vehement pain in the eye, without, or with very little redness. The sensation of pain is various, as itching, burning, or as if gravel were between the globe of the eye and lids. The species are: 1. Ophthalmodynia rheumatica, which is a pain in the muscular expansions of the globe of the eye, without redness in the albuginea. The rheumatic inflammation is serous, and rarely produces redness. 2. Ophthalmodynia periodica, is a periodical pain in the eye, without redness. 3. Ophthalmodynia spasmodica, is a pressing pain in the bulb of the eye, arising from spasmodic contractions of the muscles of the eyes, in nervous, hysteric, and hypochondriac persons. It is observed to terminate by a flow of tears. 4. Ophthalmodynia from an internal inflammation of the eye. In this disorder, there is a pain and sensation as if the globe was pressed out of the orbit. 5. Ophthalmodynia hydrophthalmica. After a great pain in the inferior part of the os frontis, the sight is obscured, the pupil is dilated, and the bulb of the eye appears larger, pressing on the lid. This species is likewise perceived from an incipient hydrophthalmia of the vitreous humour. 6. Ophthalmodynia arenosa, is an itching and a sensation of pain in the eye, as if sand or gravel were lodged between the globe and lid. 7. Ophthalmodynia symptomatica, which is a symptom of some other eye disease, and is to be cured by removing the exciting cause. 8. Ophthalmodynia cancrosa, which arises from cancerous acrimony deposited in the eye, and is rarely curable.

OPHTHALMOPTOSIS. (οφθαλμοπτωσις; from οφθαλμος, an eye, and πτωσις, a fall.) A falling down of the globe of the eye on the cheek, canthus, or upwards, the globe itself being scarce altered in magnitude. The cause is a relaxation of the muscles, and ligamentous expansions of the globe of the eye. The species are: 1. Ophthalmoptosis violenta, which is generated by a violent contusion or strong stroke, as happens sometimes in boxing. The eye falls out of the socket on the cheek or canthus of the eye, and from the elongation and extension of the optic nerve occasions immediate blindness. 2. Ophthalmoptosis, from a tumour within the orbit. An exostosis, tophs, abscess, encysted tumours, as, atheroma, hygroma, or scirrhus, forming within the orbit, induration of the orbital adeps, may throw the bulb of the eye out of the socket upwards, downwards, or towards either canthus. 3. Ophthalmoptosis paralytica, or the paralytic ophthalmoptosis, which arises from a paralysis or palsy of the recti muscles, from hence a stronger power in the oblique muscles of the bulb. 4. Ophthalmoptosis staphylomatica, when the staphyloma depresses the inferior eyelid and extends on the cheek.

OPIATES. Medicamenta opiata. Medicines that procure sleep, &c. See ANODYNES.

OPIATE. *a.* Soporiferous; somniferous; narcotic; causing sleep (*Bacon*).

OPIE (John, R. A.), an eminent English painter, was born in Cornwall in 1761. He passed the early part of his youth in the shop of a country carpenter; but nature manifestly designed him for nobler pursuits; and some of his infantine attempts at painting and drawing having been seen and admired by Dr. Wolcott, he was quickly released from hard labour and mental bondage. This active patron took him under his protection, cultivated his genius, encouraged his ardour, and opened to him the path to fame and fortune. The care of the instructor was amply repaid, and Dr. Wolcott soon had the pleasure of witnessing the youth's improvement in the portrait of an old beggarman, executed with prodigious spirit, and still in the doctor's possession.

In a short time Mr. Opie began to earn a scanty livelihood by his pencil at Exeter: but the lustre of his talents could not remain long obscured; and the praises deservedly bestowed on his performances induced our young artist to resign the limited employment of a provincial city for the hopes of riches and reputation in this great metropolis. Although at this period Mr. Opie was only about 19 years old, the event soon shewed that his hopes were not ill founded; the originality and strength of his manner of painting soon gained him notice, and he was liberally employed.

It was not, however, till the year 1786 that he exhibited any of his pictures at Somerset-house; shortly after which he was nominated an associate, and then an academician. It was about this time that he produced some large historical pictures, and amongst others the Death of David Rizzio and the Murder of James, king of Scotland; this latter is considered his *chef d'oeuvre,* and abundantly shews how much might have been expected from Opie as an historical painter had he not, like others, for want of sufficient employment in that line, been obliged so frequently to relin-

quish his favourite pursuit for the humbler but more lucrative province of portrait painting. He painted several pictures for Mr. Boydell's Shakspeare, and others for the Bible of Macklin; amongst which the Presentation in the Temple, and the Sacrifice of Jephtha's Daughter stand pre-eminent for boldness of conception and strength of colour and effect. We cannot here enumerate even the principal works of Mr. Opie; suffice it to say, that in his latter pictures of history he has ably sustained that reputation which he so deservedly acquired by his earlier productions. His Death of Sapphira astonishes by the novelty of its composition, as well as by its prodigious relief. His Hubert and Arthur, for Mr. Woodmason's Shakspeare, is a master-piece of expression; and his picture of Juliet at the Balcony by by Moonlight, evinces a tenderness of feeling which the subjects he generally chose seldom gave him an opportunity of displaying.

In landscape he always succeeded in producing a striking effect; and many of his works in this way, though in an unfinished style, are deservedly prized.

In his portraits of women, there is not unfrequently a want of that delicacy which we so much admire in the works of his predecessor Reynolds, and to this the apparent rudeness of his pencil did not a little contribute; but in his representation of the male head, and more particularly when that head possessed a decided character, Opie has certainly in many cases equalled the most successful efforts of the greatest painters since the revival of the art. His picture of his friend, Mr. Holcroft, seems to breathe, and that of Mr. Tresham is perhaps as true a representation of a pale studious man, as the pencil of the great Titian could have accomplished. That in his portraits there was sometimes a vulgarity of character cannot be denied: but, besides many other instances which might be produced, his whole length of the duke of Gloucester, in a late exhibition, is sufficient to prove that this defect did not constantly pervade them. In this his last work, Opie has shewn himself as capable of depicting the dignified deportment of the prince, as he was of delineating the rude unpolished features of the beggar, or the savage grin of the assassin.

The style of Opie is the very reverse of insipidity, and strictly original. His conceptions are as bold, as his execution is energetic and forcible; and he gave a degree of projection to his figures, perhaps unattained since the time of Caravaggio, to whom of all other masters he seems to bear the nearest resemblance. Had a sufficient knowledge of drawing been superadded to his other acquirements, so as to have enabled him to give something of that ideal beauty of form and character required in the higher departments of art, but which the necessity of constantly painting from the model before him rendered impossible, he might have held a very eminent rank even amongst the great artists of the Italian schools: as it is, he has left a void which will not easily be filled up, and his works exhibit a powerful example of what may be attained by the uniform and well-directed efforts of a strong mind to one decided object.

The private character of Mr. Opie was strictly conformable to his professional one; and although he had cultivated his mind by much reading, there was a want of polish in his manner which, upon a first acquaintance, gave not full indication of that urbanity and benevolence, which, by those who knew him well, he was found so eminently to possess.

On Mr. Fuseli's vacating the professorship of painting to the Royal Academy, Mr. Opie was chosen his successor; and shortly before his death delivered four admirable lectures to the students of that institution, which we hope will be given to the public through the medium of the press. Mr. Opie died at his house in Berners-street, April 9, 1807, in the 47th year of his age. He has left no children; but his loss will be long and severely felt by an accomplished widow, formerly Miss Alderson, of Norwich, a lady well known to the world by her interesting stories and poetical effusions.

O'PIFICE. *s.* (*opificium*, Lat.) Workmanship; handiwork.

O'PIFICER. *s.* (*opifex*, Latin.) One that performs any work; an artist (*Bentley*).

O'PINABLE. *a.* (*opinor*, Latin.) Which may be thought.

OPINA'TION. *s.* (*opinor*, Lat.) Opinion; notion.

OPINA'TOR. *s.* (*opinor*, Lat.) One who holds an opinion (*Hale*).

To OPI'NE. *v. n.* (*opinor*, Lat.) To think; to judge; to be of opinion (*Pope*).

OPI'NIATIVE. *a.* (from *opinion*.) 1. Stiff in a preconceived notion. 2. Imagined; not proved (*Glanville*).

OPINIA'TOR. *s.* (*opiniatre*, Fr.) One fond of his own notion (*Clarendon*).

OPINIA'TRE. *a.* (French.) Obstinate; stubborn; inflexible (*Locke*).

OPINIA'TRETY. OPI'NIATRY. *s.* (*opiniatreté*, French.) Obstinacy; inflexibility; determination of mind; stubbornness (*Locke*).

OPI'NION. *s.* (*opinion*, Fr. *opinio*, Latin.) 1. Persuasion of the mind, without proof or certain knowledge (*Ben Jonson*). 2. Sentiments; judgment; notion (*South*). 3. Favourable judgment (*Locke*).

To OPI'NION. *v. n.* (from the noun.) To opine; to think: out of use (*Glanville*).

OPI'NIONATIVE. *a.* (from *opinion*.) Fond of preconceived notions; stubborn (*Burnet*).

OPI'NIONATIVELY. *ad.* Stubbornly.

OPI'NIONATIVENESS. *s.* (from *opinionative*.) Obstinacy.

OPI'NIONIST. *s.* (*opinioniste*, French; from *opinion*.) One fond of his own notions (*Glanville*).

OPI'PAROUS. *a.* (*opiparus*, Lat.) Sumptuous.

OPISTHOTONOS. (οπισθοτονος, from οπισθεν, backwards, and τεινω, to draw.) A clonic spasm of several muscles, so as to keep the

body in a fixed position, and bent backwards. Cullen considers it as a variety of tetanus. See TETANUS.

OPITIUS (Henry), a lutheran divine, born 1642, in Misnia. He was professor of oriental languages at Kiel, where he died, 1712. He wrote some fanciful treatises on the subject of grammar. He edited also the bible in Hebrew, 2 vols. 4to.

OPITIUS (Martin), a poet, born in Silesia, 1597. He died of the plague at Dantzic, 1639. His poems in Latin and in German are much admired for their elegance and spirit.

OPITULATION. *s.* (*opitulatio*, Latin.) An aiding; a helping.

OPIUM. (οπιον, from οπος, juice, or rather from *opi*, Arab.) A gummy juice obtained by incisions from the head of the papaver somniferum of Linnéus. Papaver calycibus capsulisque glabris, foliis amplexicaulibus incisis. C. O. Polyandria, Monogynia; in Persia, Arabia, and other warm regions of Asia. It is imported into Europe in flat cakes, covered with leaves to prevent their sticking together; it has a reddish brown colour, and a strong peculiar smell; its taste at first is nauseous and bitter, but soon becomes acrid, and produces a slight warmth in the mouth. The use of this celebrated medicine, though not known to Hippocrates, can be clearly traced back to Diagoras, who was nearly his cotemporary, and its importance has ever since been gradually advanced by succeeding physicians of different nations. Its extensive practical utility, however, has not been long well understood; and in this country perhaps may be dated from the time of Sydenham. Opium is the chief narcotic now employed: it acts directly upon the nervous power, diminishing the sensibility, irritability, and mobility of the system: and, according to Cullen, in a certain manner suspending the motion of the nervous fluid to and from the brain, and thereby inducing sleep, one of its principal effects. From this sedative power of opium, by which it allays pain, inordinate action, and restlessness, it naturally follows, that it may be employed with advantage in a great variety of diseases. Indeed, there is scarcely any disorder in which, under some circumstances, its use is not found proper; and though in many cases it fails of producing sleep, yet, if taken in a full dose, it occasions a pleasant tranquillity of mind, and a drowsiness, which approaches to sleep, and which always refreshes the patient. Besides the sedative power of opium, it is known to act more or less as a stimulant, when given in a large dose, exciting the motion of the blood. By a certain conjoined effort of this sedative and stimulant effect, opium has been thought to produce intoxication, a quality for which it is much used in eastern countries. It is frequently employed in fevers where there is no inflammatory diathesis; in hæmorrhages, dysentery, diarrhœas, cholera, and pyrosis; colic, tetanus, and all convulsive disorders. Respecting the external application of opium, authors seem not sufficiently agreed. Some allege, that when applied to the skin it allays pain and spasm, procures sleep, and produces all the salutary or dangerous effects which result from its internal use; while others say, that thus applied it has little or no effect whatever. It has also been asserted, that when mixed with caustic it diminishes the pain which would otherwise ensue; and if this be true, it is probably by decreasing the sensibility of the part. Injected by the rectum, it has all the effect of opium taken into the stomach; but to answer this purpose, double the quantity is to be employed. Applied to the naked nerves of animals, it produces immediate torpor and loss of power in all the muscles with which the nerves communicate. Opium, taken into the stomach in immoderate doses, proves a narcotic poison, producing vertigo, tremors, convulsions, delirium, stupor, stertor, and finally, fatal apoplexy. In the year 1779, opium was introduced into practice as a specific against the lues venerea. It was employed in several of the military hospitals, where it acquired the reputation of a most efficacious remedy; and Dr. Michaelis, physician of the Hessian forces, published an account of a great number of successful experiments made with it, in the first volume of the Medical Communications in the year 1784. Opium was afterwards given as an anti-venereal remedy in some foreign hospitals. Many trials were also made of its virtues in several of the London hospitals, and in the Royal Infirmary at Edinburgh. Very favourable reports of its efficacy in removing venereal complaints were published by different practitioners; but, at the same time, so many deductions were to be made, and so many exceptions were to be admitted, that it required little sagacity to discover, that most of the advocates for this medicine reposed but a slender and fluctuating confidence in its anti-venereal powers. Mr. Pearson made several experiments on the virtues of opium in lues venerea at the Lock Hospital in the years 1784 and 1785; and published a narrative of its effects, in the second volume of the Medical Communications.

The result of my experiments, says he, was very unfavourable to the credit of this new remedy; and I believe that no surgeon in this country relies on opium as a specific against the venereal virus. I have been long accustomed to administer opium with great freedom during the venereal course; and the experience of nearly twenty years has taught me, that when it is combined with mercury, the proper efficacy of the latter is not in any measure increased; that it would not be safe to rely upon a smaller quantity of the mineral specific, not to contract the mercurial course within a shorter limit than where no opium has been employed. This representation will not, I presume, admit of controversy; yet we frequently hear people expressing themselves upon this head, as if opium manifested some peculiar qualities in venereal complaints, of a distinct nature from its well-known narcotic properties, and thus afforded an important aid to

mercury in the removal of lues venerea. Perhaps it may not be unuseful to disentangle this subject from the perplexity in which such indefinite language necessarily involves it. Opium, when given in conjunction with mercury, by diminishing the sensibility of the stomach and bowels, prevents many of those inconveniences which this mineral is apt to excite in the primæ viæ; and thus its admission into the general system is facilitated. Mercury will likewise often produce a morbid irritability, accompanied with restlessness and insomnolescence, and it sometimes renders venereal sores painful and disposed to spread. These accidental evils, not necessarily connected with the venereal disease, may be commonly alleviated, and often entirely removed, by a judicious administration of opium; and the patient will consequently be enabled to persist in using the mineral specific. It, however, must be perfectly obvious, that opium, in conferring this sort of relief, communicates no additional virtues to mercury, and that, in reality, it assists the constitution of the patient, not the operation of the medicine with which it is combined. The salutary effects of mercury as an antidote may be diminished or lost by the supervention of vomiting, dysentery, &c. Opium will often correct these morbid appearances, and so will spices, wine, an appropriate diet, &c. yet it would be a strange use of words to urge, wherever these articles of food were beneficial to a venereal patient, that they concurred in augmenting the medicinal virtues of mercury. It may be supposed that the majority of medical men would understand by the terms, "to assist a medicine in curing a contagious disease," that the drug conjoined with the specific actually increased its medicinal efficacy; whereas, in the instances before us, it is the human body only which has been aided to resist the operation of certain noxious powers, which would render a preference in the antidote prejudicial or impossible. The soothing qualities of this admirable medicine can scarcely be estimated too highly. Yet we must beware of ascribing effects to them which have no existence; since a confidence in the antivenereal virtues of opium would be a source of greater mischief, than its most valuable properties would be able to compensate. The officinal preparations of this drug are, opium purificatum, pilulæ ex opio, pulvis opiatus, tinctura opii, and tinctura opii camphorata: it is also an ingredient in the pulvis sudorificus, balsamum anodynum, electuarium japonicum, pulvis e creta compositus, &c.

OPOBALSAMUM. See Balsamum Gileadense.

OPODELDOC, a term of no meaning, invented by Paracelsus. Formerly it signified a plaster for all external injuries, but now is confined to a camphorated soap liniment.

OPOPANAX. (ὀποπάναξ, from ὀπός, juice, and πάναξ, the panacea.) The gummi-resinous juice of the pastinacea opopanax of Linnéus (pastinaca foliis pinnatis, foliolis basi antica excisis. C. O. Pentandria, Digynia), obtained by means of incisions made at the bottom of the stalk of the plant, from which it gradually exudes, and by undergoing spontaneous concretion, assumes the appearance under which we have it imported from Turkey and the East Indies, viz. sometimes in little drops or tears, more commonly in irregular lumps, of a reddish yellow colour on the outside, with specks of white; internally of a paler colour, and frequently variegated with large white pieces. Opopanax has a strong disagreeable smell, and a bitter, acrid, somewhat nauseous taste. It is only employed in the present practice as an antispasmodic, in combination with other medicines, although it was formerly in high estimation as an attenuant, deobstruent, and aperient. Its antispasmodic virtues are less powerful than galbanum, and more so than ammoniacum. It has no place in the Edinburgh Pharmacopœia, but is directed by the London College in the pilulæ e gummi.

OPORTO, or O Porto, a city and seaport of Portugal, in the province of Entre Duero e Minho, situated on the Duero, about a league from its mouth. It owes its origin to a town called Cale or Gaya, which lay on a rugged mountain on the other side of the river, being built by part of its inhabitants as a much more convenient situation; and therefore called Portucale, or Porto de Cale. It was afterwards, on account of its wealth and flourishing commerce, erected into a bishop's see. The whole kingdom has received its name from hence. It was formerly subject to particular lords, but at present belongs to the crown, and is built on the declivity of a steep mountain. The river forms a barred harbour, the entrance of which is difficult and dangerous, and requires a pilot and great care to navigate a vessel, on account of some sand-banks and rocks, and is, on this account, so secure from approaches of an enemy by sea, that the Portuguese government has not thought proper to fortify it in any degree complete, having only an old wall, five or six feet thick, flanked with, here and there, a mean tower; the other fortifications are, a small fort, with four bastions, and a half moon. The road is spacious, and will contain a large fleet: that from Brazil sometimes rides here. The town, as to its situation, is uneven, but is, in general, handsome: next to Lisbon, it is the richest, most populous, and most commercial town in the kingdom; and, without any exception, is accounted the cleanest, and is well paved. Its commerce increased after the earthquake at Lisbon: before that time, the population was estimated at 20,000, it is now said to be near 50,000. Here are seven churches, several hospitals, and twelve convents. The principal trade is in wine, of which upwards of 80,000 pipes are exported annually. Here are several academies, and an arsenal for the fitting out ships of war, which are built in the docks, belonging to the town; and the quay extends from one end of the city to the other: nineteen leagues N. Coimbra, and fifty N. Lisbon. Lon. 8. 22 W. Lat. 41. 10 N.

OPOSSUM, in mastiology. See DIDELPHIS.

OPPEDE (John Meyner, baron d'), president of the parliament of Aix, rendered himself odious by his cruelties against the Vaudois. Not only the 19 condemned to the stake were destroyed, but 22 villages were devoted to the flames, and above 4000 persons perished by the sword or by fire, during that horrible persecution. He died 1558.

OPPIANUS, a Greek poet of Cilicia in the second century. He wrote some poems, celebrated for their elegance and sublimity. Two of them are now extant, called Alienticon, and Cynegeticon. The emperor Caraailla was so pleased with his poetry that he gave him a piece of gold for every verse of his Cynegeticon; from which circumstance the poem received the name of the golden verses of Oppian. The poet died of the plague in the 30th year of his age.

O'PPIDAN. *s.* (*oppidanus*, Lat.) A townsman; an inhabitant of a town.

To OPPI'GNERATE, *v. a.* (*oppignero*, Lat.) To pledge; to pawn: not in use (*Bacon*).

To O'PPILATE *v. a.* (*oppilo*, Lat. *oppiler*, Fr.) To heap up obstruction.

OPPILATION. *s.* (*oppilation*, French.) Obstruction; matter heaped together (*Harvey*).

O'PPILATIVE. *a.* (*oppilative*, French.) Obstructive.

OPPLE'TED. *a.* (*oppletus*, Latin.) Filled; crowded.

OPPONENS POLLICIS. In myology. See FLEXOR OSSIS METACARPI POLLICIS.

OPPO'NENT. *a.* (*opponens*, Latin.) Opposite; adverse (*Prior*).

OPPO'NENT. *s.* (*opponeus*, Latin.) 1. Antagonist; adversary. 2. One who begins the dispute by raising objections to a tenet (*More*).

OPPORTU'NE. *a.* (*opportunus*, Lat.) Seasonable; convenient; fit; timely; well-timed; proper (*Milton*).

OPPORTU'NELY. *ad.* (from *opportune*.) Seasonably; conveniently; with opportunity either of time or place (*Wotton*).

OPPORTU'NITY. *s.* (*opportunitas*, Lat.) Fit time; fit place; time; convenience; suitableness of circumstances to any end (*Denh.*).

To OPPO'SE. *v. a.* (*opposer*, French.) 1. To act against; to be adverse; to hinder; to resist (*Shakspeare*). 2. To put in opposition; to offer as an antagonist or rival (*Locke*). 3. To place as an obstacle (*Dryden*). 4. To place in front (*Shakspeare*).

To OPPO'SE. *v. n.* 1. To act adversely (*Shakspeare*). 2. To object in a disputation; to have the part of raising difficulties against a tenet supposed to be right.

OPPO'SELESS. *a.* (from *oppose*.) Irresistible; not to be opposed (*Shakspeare*).

OPPO'SER. *s.* (from *oppose*.) One that opposes; antagonist; enemy; rival (*Blackm.*).

O'PPOSITE. *a.* (*opposite*, French.) 1. Placed in front; facing each other (*Milt.*). 2. Adverse; repugnant (*Rogers*). 3. Contrary (*Tillotson*).

O'PPOSITE. *s.* Adversary; opponent; antagonist; enemy (*Hooker*).

OPPOSITE LEAVES. In botany, growing in pairs, each pair decussated, or crossing that above and below it. Opposite branches and peduncles. Contrasted with alternate.

O'PPOSITELY. *ad.* (from *opposite*.) 1. In such a situation as to face each other (*Grew*). 2. Adversely (*May*).

O'PPOSITENESS. *s.* (from *opposite*.) The state of being opposite.

OPPOSI'TION. *s.* (*opposition*, French.) 1. Situation so as to front something opposed; standing over against. 2. Hostile resistance (*Milton*). 3. Contrariety of affection (*Tillotson*). 4. Contrariety of interest; contrariety of measures (*Pearson*). 5. Contrariety of meaning; diversity of meaning (*Hooker*). 6. Inconsistency (*Locke*).

To OPPRE'SS. *v. a.* (*oppressus*, Latin.) 1. To crush by hardship or unreasonable severity (*Pope*). 2. To overpower; to subdue (*Shakspeare*).

OPPRE'SSION. *s.* (*oppression*, French.) 1. The act of oppressing; cruelty; severity. 2. The state of being oppressed; misery (*Sh.*). 3. Hardship; calamity (*Addison*). 4. Dulness of spirits; lassitude of body (*Arb.*).

OPPRE'SSIVE. *a.* (from *oppress*.) 1. Cruel; inhuman; unjustly exactious or severe. 2. Heavy; overwhelming (*Rowe*).

OPPRE'SSOR. *s.* (from *oppresseur*.) One who harasses others with unreasonable or unjust severity (*Sandys*).

OPPRO'BRIOUS. *a.* (from *opprobrium*, Latin.) 1. Reproachful; disgraceful; causing infamy; scurrilous (*Addison*). 2. Blasted with infamy (*Milton*).

OPPRO'BRIOUSLY. *ad.* Reproachfully; scurrilously (*Shakspeare*).

OPPRO'BRIOUSNESS. *s.* (from *opprobrious*.) Reproachfulness; scurrility.

To OPPU'GN. *v. a.* (*oppugno*, Latin.) To oppose; to attack; to resist (*Harvey*).

OPPU'GNANCY. *s.* (from *oppugn*.) Opposition (*Shakspeare*).

OPPU'GNER. *s.* (from *oppugn*). One who opposes or attacks (*Boyle*).

OPS (Opis), a daughter of Cœlus and Terra, the same as the Rhea of the Greeks, married Saturn, and became mother of Jupiter. She was known among the ancients by the different names of Cybele, Bona Dea, Magna Mater, Thya, Tellus, Proserpina, and even of Juno and Minerva; and the worship paid to these apparently several deities was offered merely to one and the same person, mother of the gods. Tatius built her a temple at Rome, where her festivals were called Opalia, &c.

OPSI'MATHY. *s.* (ὀψιμαθία.) Late education; late erudition.

OPSONA'TION. *s.* (*opsonatio*, Lat.) Catering; a buying provisions.

OPSOPÆUS (John), a German critic. He became a physician, and was professor of medi-

cine at Heidelberg. He edited some of the works of Hippocrates, with notes; but his best known work is an edition of the Sibylline oracles. He died 1596, aged 40.

O'PTABLE. *a.* (*optabilis*, Lat.) Desirable; to be wished.

O'PTATIVE. *a.* (*optativus*, Latin.) Expressive of desire (*Clarke*).

OPTATIVE, in grammar, the third mood in the conjugations of verbs, serving to express an ardent desire or wish for any thing.

Instead of a particular mood, or a particular set of inflexions to express this desire, the English, Latins, &c. express it by an adverb of wishing prefixed to it. The Latins by *utinam*; the French by *plût à Dieu*; and the English by would to God, &c.

In these languages, setting aside the adverb, the optative is the same with the subjunctive; the inflexions of the verb, which make what we call the moods, being the same in both.

Indeed, in the Greek, the wish is expressed by a particular inflexion, thence called optative; and in the French, Spanish, and Italian, there is something like it; their triple senses serving the same purpose. But the optative mood may be safely retrenched from the Latin and English.

O'PTIC. *a.* (ὀπτικός.) 1. Visual; producing vision; subservient to vision (*Newton*). 2. Relating to the science of vision (*Wotton*).

O'PTIC. *s.* An instrument of sight; an organ of sight (*Brown*).

OPTIC ANGLE. The angle which the optic axes of both eyes make with one another, as they tend to meet at some distance before the eyes.

OPTIC AXES. The axes of the eye, or a line going through the middle of the pupil and the centre of the eye.

OPTIC CHAMBER. See CAMERA OBSCURA.

OPTIC NERVES. (*nervi optici*, from ὄπτομαι, to see; because they are the organs of sight.) The second pair of nerves of the brain, arise from the thalami nervorum opticorum, perforate the bulb of the eye, and in it form the retina.

OPTIC PENCIL. See PENCIL.

O'PTICAL. *a.* (ὀπτικός.) Relating to the science of optics (*Boyle*).

OPTI'CIAN *s.* (from *optic.*) One skilled in optics.

OPTICS, (from ὄπτομαι, to see,) is that science which considers the nature, the composition, and the motion of light;—the changes which it suffers from the action of bodies;—the phenomena of vision, and the instruments in which light is the chief agent.

HISTORY.

Sect. I. *Discoveries concerning the Refraction of Light.*

Though the ancients made few optical experiments, they nevertheless knew, that when light passed through media of different densities, it did not move in a straight line, but was bent or refracted out of its original direction. This was probably suggested to them by the appearance of a straight rod partly immersed in water; and accordingly we find many questions concerning this and other optical appearances in the works of Aristotle. Archimedes is said to have written a treatise on the appearance of a ring or circle under water, and therefore could not have been ignorant of the common phenomena of refraction. The ancients, however, were not only acquainted with these more ordinary appearances, but also with the production of colours by refraction. Seneca says, that if the light of the sun shines through an angular piece of glass, it will show all the colours of the rainbow. These colours, he says, are false, such as are seen in a pigeon's neck when it changes its position; and of the same nature, he says, is a speculum, which, without having any colour of its own, assumes that of any other body. It appears also, that the ancients were not ignorant of the magnifying power of glass globes filled with water, though they do not seem to have been acquainted with its cause; and the ancient engravers are supposed to have used a glass globe filled with water to magnify their figures. This indeed seems evident, from their lenticular and spherical gems of rock crystal which are still preserved, the effect of which, in magnifying at least, could scarcely have escaped the notice of those who had often occasion to handle them; if indeed, in the spherical or lenticular form, they were not solely intended for the purposes of burning. One of these, of the spherical kind, of about an inch and a half diameter, is preserved among the fossils presented by Dr. Woodward to the university of Cambridge.

The first treatise of any consequence written on the subject of optics was by the celebrated Ptolemy. The treatise is now lost; but from the accounts of others, we find that he treated of astronomical refractions. The first astronomers were not aware that the intervals between stars appear less near the horizon than near the meridian; but it is evident that Ptolemy was aware of this circumstance, by the caution which he gives to allow something for it, upon every recourse to ancient observations.

Ptolemy also advances a very sensible hypothesis to account for the greater apparent size of the sun and moon when seen near the horizon. The mind, he says, judges of the size of objects by means of a preconceived idea of their distance from us: and this distance is fancied to be greater when a number of objects intervene; which is the case when we see the heavenly bodies near the horizon. In his Almagest, however, he ascribes this appearance to a refraction of the rays by vapours, which actually enlarge the angle subtended by the luminaries.

The nature of refraction was afterwards considered by Alhazen an Arabian writer; insomuch that, having made experiments upon it at the common surface between air and water, air and glass, water and glass; and, being prepossessed with the ancient opinion of crystalline orbs in the regions above the atmosphere, he even suspected a refraction there also, and fancied he could prove it by astronomical observations. Hence this author concludes, that refraction increases the altitudes of all objects in the heavens; and he first advanced, that the stars are sometimes seen above the horizon by means of refraction, when they are really below it. This observation was confirmed by Vitellio, B. Waltherus, and by the excellent observations of Tycho Brahe. Alhazen observed, that refraction contracts the vertical diameters and distances of the heavenly bodies, and that it is the cause of the twinkling of the stars. But we do

and that either he, or his follower Vitellio, subjected it to mensuration. Indeed it is too small to be determined except by very accurate instruments, and therefore we hear little more of it till about the year 1500, when great attention was paid to the subject by Bernard Walther, Mæstlin, and Tycho Brahe.

Alhazen supposed that the refraction of the atmosphere did not depend upon the vapours, but on the different transparency; by which, as Montucla conjectures, he meant the density of the gross air contiguous to the earth, and the ether or subtile air that lies beyond it. We judge of distance, he says, by comparing the angle under which objects appear, with their supposed distance; so that if these angles be nearly equal, and the distance of one object be conceived greater than that of the other, it will be imagined to be larger. He also observes, that the sky near the horizon is always imagined to be further from us than any other part of the concave surface. Roger Bacon ascribes this account of the horizontal moon to Ptolemy; and as such it is examined, and objected to by B. Porta.

In the writings of Roger Bacon, we find the first distinct account of the magnifying power of glasses; and it is not improbable, that what he wrote upon this subject gave rise to the useful invention of spectacles. He says, that if an object be applied close to the base of the larger segment of a sphere of glass, it will appear magnified. He also treats of the appearance of an object through a globe, and says that he was the first who observed the refraction of rays into it.

Vitellio, a native of Poland, published a treatise of optics, about 1270, containing all that was valuable in Alhazen. He observes, that light is always lost by refraction; but he does not pretend to estimate the quantity of this loss. He reduced into a table the result of his experiments on the refractive powers of air, water, and glass, corresponding to different angles of incidence. In his account of the horizontal moon he agrees exactly with Alhazen. He ascribes the twinkling of the stars to the motion of the air in which the light is refracted; and to illustrate this hypothesis, he observes that they appear to twinkle still more when viewed in water put in motion. He also shows, that refraction is necessary as well as reflection to form the rainbow; because the body which the rays fall upon is a transparent substance, at the surface of which one part of the light is always reflected and another refracted. But he seems to consider refraction as serving only to condense the light, thereby enabling it to make a stronger impression upon the eye. This writer also made many attempts to ascertain the law of refraction. He likewise considers the foci of glass spheres, and the apparent size of objects seen through them; though upon these subjects his observations are inaccurate. It is sufficient indeed to show the state of knowledge, at that time, to observe, that both Vitellio, and his master Alhazen, account for objects appearing larger when seen under water, by the circular figure of its surface; since, being fluid, it conforms to the figure of the earth.

Contemporary with Vitellio was Roger Bacon, a man of extensive genius, who wrote upon almost every branch of science; yet in optics he does not seem to have made any considerable advances. Even some of the most absurd of the opinions of the ancients have had the sanction of his authority. He believed that visual rays proceed from the eye; because every thing in nature is qualified to discharge its proper functions by its own powers, in the same manner as the sun and other celestial bodies. In his Specula Mathematica, he added some observations of little importance on the refraction of the light of the stars; the apparent size of objects; the enlargements of the sun and moon in the horizon. In his Opus Majus he demonstrates, what Alhazen had done before, that if a transparent body interposed between the eye and an object be convex towards the eye, the object will appear magnified.

From this time, to that of the revival of learning in Europe, we have no treatise on optics. One of the first who distinguished himself in this way was Maurolycus, teacher of mathematics at Messina, about 1575. In two works, entitled Theoremata Lucis et Umbræ, and Diaphanorum Partes, &c. he demonstrates that the crystalline humour of the eye is a lens that collects the rays of light issuing from the object, and throws them upon the retina, where is the focus of each pencil. From this principle he discovered the reason why some people were short-sighted and others long-sighted; and why the former are relieved by concave, and the others by convex glasses.

While Maurolycus made such advances towards the discovery of the nature of vision, Baptista Porta of Naples, born 1445, died 1515, invented the camera obscura, which throws still more light on the same subject. His house was resorted to by all the ingenious persons at Naples, whom he formed into an academy of secrets; each member being obliged to contribute something useful and not generally known. By this means he was furnished with materials for his Magia Naturalis, which contains his account of the camera obscura, and which was published, as he informs us, when he was not quite fifteen years old. He also gave the first hint of the magic lantern; which Kircher afterwards improved. His experiments with the camera obscura convinced him, that vision, as Aristotle supposed, is performed by the intromission of something into the eye, and not by visual rays proceeding from the eye, as had been formerly imagined by Empedocles; and he was the first who fully satisfied himself and others upon this subject. The resemblance indeed between experiments with the camera obscura and the manner in which vision is performed in the eye, was too striking to escape the observation of a less ingenious person. But when he says that the eye is a camera obscura, and the pupil the hole in the window shutter, he was so far mistaken as to suppose that it was the crystalline humour that corresponds to the wall which receives the images; nor was it discovered till the year 1604, that this office is performed by the retina. He makes a variety of just observations on vision; and explains several cases in which we imagine things to be without the eye, when the appearances are occasioned by some affection of the organ itself, or some motion within it. He remarks also that, in certain circumstances, vision will be assisted by convex or concave glasses; and he seems also to have made some small advances towards the discovery of telescopes. He observes, that a round and flat surface plunged into water, will appear hollow as well as magnified to an eye above it; and he explains by a figure the manner in which this effect is produced.

The great problem concerning the measure of

refractions was still unsolved. Alhazen and Vitellio, indeed, had attempted it; but failed, by trying to measure the angle instead of its sine. At last it was discovered by Snellius, professor of mathematics at Leyden, about 1637. This philosopher, however, did not perfectly understand his own discovery, nor did he live to publish any account of it. It was afterwards explained by professor Hortensius before it appeared in the writings of Descartes, who published it under a different form, without making any acknowledgment of his obligations to Snellius, whose papers, Huygens assures us, were seen by Descartes. Before this time Kepler had published a New Table of Angles of Refraction, determined by his own experiments, for every degree of incidence. Kircher had done the same, and attempted a theory of refraction, on principles, which, if conducted with precision, would have led him to the law discovered by Snellius.

Descartes undertook to explain the cause of refraction by the resolution of forces. Hence he was obliged to suppose that light passes with more ease through a dense medium, than through a rare one. The truth of this explanation was first questioned by M. Fermat, who asserted, contrary to the opinion of Descartes, that light suffers more resistance in water than air, and more in glass than in water; and maintained, that the resistance of different media with respect to light is in proportion to their densities. M. Leibnitz adopted the same general idea, upon the principle that nature accomplishes her ends by the shortest methods, and that light therefore ought to pass from one point to another, either by the shortest road, or that in which the least time is required.

At a meeting of the Royal Society, August 31, 1664, it was found, with a new instrument prepared for that purpose, that the angle of incidence being 40 degrees, that of refraction is 30. About this time also we find the first mention of media not refracting the light in an exact proportion to their densities. For Mr. Boyle, in a letter to Mr. Oldenburgh, dated Nov. 3, 1664, observes, that in spirit of wine, the proportion of the sines of the angles of incidence to the sines of the angles of refraction was nearly the same as 4 to 3; and that, as spirit of wine occasions a greater refraction than common water, so oil of turpentine, which is lighter than spirit of wine, produces not only a greater refraction than common water, but a much greater than salt water. And at a meeting held November 9, the same year, Dr. Hooke mentioned, that pure and clear salad oil produced a much greater refraction than any liquor which he had tried; the angle of refraction that answered to an angle of incidence of 30° being no less than 40° 30′, and the angle of refraction that answered to an angle of incidence of 20° being 29° 47′.—M. de la Hire also made several experiments to ascertain the refractive power of oil, and found the sine of the angle of incidence to that of refraction as 60 to 42; which, he observes, is a little nearer to that of glass than to that of water, though oil is much lighter than water, and glass much heavier.

The members of the Royal Society finding that the refraction of salt water exceeded that of fresh, pursued the experiment farther with aqueous solutions of vitriol, saltpetre, and alum. They found the refraction of the solution of vitriol and saltpetre a little more, but that of alum a little less, than common water.

Dr. Hooke made an experiment before the Royal Society, February 11, 1665, which clearly proves that ice refracts the light less than water. M. de la Hire also took a good deal of pains to determine whether the refractive powers of ice and water were the same; and he found as Dr. Hooke had done before, that ice refracts less than water.

By a most accurate experiment made in 1698, in which a ray of light was transmitted through a Torricellian vacuum, Mr. Lowthorp found, that the refractive power of air is to that of water as 36 to 34.400. He observes that the refractive power of bodies is not proportioned to the density, at least not to the specific gravity, of the refracting medium. For the refractive power of glass to that of water is as 55 to 34, whereas its specific gravity is as 87 to 34; that is, the squares of their refractive powers are very nearly as their respective gravities. And there are some fluids, which, though they are lighter than water, yet have a greater power of refraction. Thus the refractive power of spirit of wine, according to Dr. Hooke's experiment, is to that of water as 36 to 33, and its gravity reciprocally as 33 to 36 or 36½. But the refractive powers of air and water seem to observe the simple direct proportion of their gravities.

The Royal Academy of Sciences at Paris endeavoured to repeat this experiment in 1700; but they did not succeed.—For, as they said, beams of light passed through the vacuum without suffering any refraction. The Royal Society being informed of this, ordered Mr. Hawksbee to make an instrument for the purpose, under the direction of Dr. Halley, for the purposes of repeating the experiment. It consisted of a strong brass prism, two sides of which had sockets to receive two plane glasses, whereby the air in the prism might either be exhausted or condensed. The prism had also a mercurial gage fixed to it, to discover the density of the contained air; and turned upon its axis, in order to make the refractions equal on each side when it was fixed to the end of a telescope. The refracting angle was near 64°; and the length of the telescope, having a fine hair in its focus, was about 10 feet. The event of this accurate experiment was as follows: Having chosen a proper object, whose distance was 2588 feet, June 15, O. S. 1708, in the morning, the barometer being then at 29.7½, and the thermometer at 60, they first exhausted the prism, and then applying it to the telescope, the horizontal hair in the focus covered a mark on the object distinctly seen through the vacuum, the two glasses being equally inclined to the visual ray. Then admitting the air into the prism, the object was seen to rise above the hair gradually as the air entered, and when the prism was full, the hair was observed to hide a mark 10¼ inches below the former mark.

After this they applied the condensing engine to the prism; and having forced in another atmosphere, so that the density of the included air was double to that of the outward, they again placed it before the telescope, and, letting out the air, the object which before seemed to rise, appeared gradually to descend, and the hair at length rested on an object higher than before by the same interval of 10¼ inches. They then forced in another atmosphere; and upon discharging the condensed air, the object was seen near 21 inches lower than before.

Now the radius in this case being 2588 feet, 10¼ inches will subtend an angle of 1′ 8″, and

the angle of incidence of the visual ray being 32 degrees (because the angle of the glass planes was 64°), it follows from the known laws of refraction, that as the sine of 32° is to that of 31° 59′ 26″, differing from 32° by 34″ the half of 1′ 8″; so is the sine of any other angle of incidence, to the sine of its angle of refraction; and so is radius, or 1000000, to 999736; which, therefore, is the proportion between the sine of incidence in vacuo and the sine of refraction from thence into common air.

It appears, by these experiments, that the refractive power of the air is proportional to its density. And since the density of the atmosphere is as its weight directly, and its temperature inversely, the ratio of its density, at any given time, may be had by comparing the heights of the barometer and thermometer; and thence he concludes that this will also be the ratio of the refraction of the air. But Dr. Smith observes, that, before we can depend upon the accuracy of this conclusion, we ought to examine whether heat and cold alone may not alter the refractive power of air, while its density continues the same.

The French academicians, being informed of the result of the above-mentioned experiment, employed M. De l'Isle the younger to repeat the former experiment with more care. He presently found, that their operators had never made any vacuum at all, there being chinks in their instrument, through which the air had insinuated itself. He therefore annexed a gage to his instrument, by which means he was sure of his vacuum; and then the result of the experiment was the same with that of the Royal Society. The refraction was always proportional to the density of the air, excepting when the mercury was very low, and consequently the air very rare; in which case the whole quantity being very small, he could not perceive much difference in them. Comparing, however, the refractive power of the atmosphere, observed at Paris, with the result of his experiment, he found, that the best vacuum he could make was far short of that of the regions above the atmosphere.

Dr. Hooke first suggested the idea of making allowance for the effect of the refraction of light, in passing from the rarer to the denser regions of the atmosphere, in the computed height of mountains. To this he ascribes the different opinions of authors concerning the height of several very high hills. He could not account for the appearance of very high mountains, at so great a distance as that at which they are actually seen, but upon the supposition of the curvature of the visual ray, that is made by its passing obliquely through a medium of such different density, from the top of them to the eye, very far distant in the horizon. All calculations of the height of mountains that are made upon the supposition that the rays of light come from the tops of them, to our eyes, in straight lines, he considers very erroneous.

Dr. Hooke ascribes the twinkling of the stars to the irregular and unequal refraction of the rays of light, which is also the reason why the limbs of the sun, moon, and planets, appear to wave or dance. That there is such an unequal distribution of the atmosphere, he says, will be evident by looking upon distant objects, over a piece of hot glass, which cannot be supposed to throw out any kind of exhalation from itself, as well as through ascending steams of water.

About this time Grimaldi first observed that the coloured image of the sun refracted through a prism is always oblong, and that colours proceeded from refraction.—The way in which he first discovered this was by Vitellio's experiment already mentioned, in which a piece of white paper placed at the bottom of a glass vessel filled with water, and exposed to the light of the sun, appears coloured. However, he observed, that in case the two surfaces of the refracted medium were exactly parallel to each other, no colours were produced. But of the true cause of these colours, he had not the least suspicion. This discovery was reserved for sir Isaac Newton, in 1666. Having procured a triangular glass prism to satisfy himself concerning the phenomena of colours, he was surprised at the oblong figure of the coloured spectrum, and the great disproportion betwixt its length and breadth; the former being about five times the measure of the latter. After various conjectures respecting the cause of these appearances, he suspected that the colours might arise from the light being dilated by some unevenness in the glass, or some other accidental irregularity; and to try this, he took another prism like the former, and placed it in such a manner, that the light, passing through them both, might be refracted in opposite directions, and thus be returned by the latter into the same course from which it had been diverted by the former. In this manner he thought that the regular effects of the first prism would be augmented by the multiplicity of refractions. The event was, that the light, diffused by the first prism into an oblong form, was by the second reduced into a circular one, with as much regularity as if it had not passed through either of them. He then hit upon what he calls the experimentum crucis, and found that light is not similar, or homogeneous; but that it consists of rays, some of which are more refrangible than others; so that, without any difference in their incidence on the same medium, some of them shall be more refracted than others; and therefore, that, according to their particular degrees of refrangibility, they will be transmitted through the prism to different parts of the opposite wall.

Since it appears from these experiments that different rays of light have different degrees of refrangibility, it follows, that the rules laid down by preceding philosophers concerning the refractive power of water, glass, &c. must be limited to the mean rays of the spectrum. Sir Isaac, however, proves, both geometrically and by experiment, that the sine of the incidence of every kind of light, considered apart, is to its sine of refraction in a given ratio.

The most important discovery concerning refraction since the time of sir Isaac Newton is that of Mr. Dollond, who found out a method of remedying the defects of refracting telescopes arising from the different refrangibility of light. Sir Isaac Newton imagined that the different rays were refracted in the same proportion by every medium, so that the refrangibility of the extreme rays might be determined if that of the mean ones were given. From this it followed, as Mr. Dollond observes, that equal and contrary refractions must not only destroy each other, but that the divergency of the colours from one refraction would likewise be corrected by the other, and that there could be no possibility of producing any such thing as refraction without colour. Hence it was natural to infer, that all object glasses of telescopes must be equally affected by the dif-

ferent refrangibility of light, in proportion to their apertures, of whatever materials they may be formed.

For this reason, philosophers despaired of bringing refracting telescopes to perfection. They therefore applied themselves chiefly to the improvement of the reflecting telescope; till 1747, when M. Euler, improving upon a hint of sir Isaac Newton's, proposed to make object glasses of water and glass; hoping, that by their difference of refractive powers, the refractions would balance one another, and thereby prevent the dispersion of the rays that is occasioned by their difference of refrangibility. This memoir of M. Euler excited the attention of Mr. Dollond. He went over all M. Euler's calculations, substituting for his hypothetical laws of refraction those which had been ascertained by Newton; and found, that, it followed from Euler's own principles, that there could be no union of the foci of all kinds of colours, but in a lens infinitely large.

Euler did not mean to controvert the experiments of Newton: but asserted, that, if they were admitted in all their extent, it would be impossible to correct the difference of refrangibility occasioned by the transmission of the rays from one medium into another of different density; a correction which he thought was very possible, since he supposed it to be effected in the eye, which he considered as an achromatic instrument. To this reasoning Mr. Dollond made no reply, but by appealing to the experiments of Newton, and the circumspection with which it was known that he conducted all his inquiries.

This paper of Euler's was particularly noticed by M. Klingenstierna of Sweden, who found that, from Newton's own principles, the result of his 8th experiment could not answer his description of it. Newton found, that when light passes out of air through several media, and thence goes out again into air, whether the refracting surfaces be parallel or inclined to one another, this light, as often as by contrary refractions it is so corrected as to emerge in lines parallel to those in which it was incident, continues ever after to be white; but if the emergent rays be inclined to the incident, the whiteness of the emerging light will, by degrees, become tinged at its edges with colours. This he tried by refracting light with prisms of glass, placed within a prismatic vessel of water.

By theorems deduced from this experiment he infers, that the refractions of the rays of every sort made out of any medium into air, are known by having the refraction of the rays of any one sort; and also that the refraction out of one medium into another is found as often as we have the refractions out of them both into any third medium.

On the contrary, the Swedish philosopher observes, that in this experiment, the rays of light, after passing through the water and the glass, though they come out parallel to the incident rays, will be coloured; but that the smaller the glass prism is, the nearer will the result of it approach to Newton's description.

This paper of M. Klingenstierna being communicated to Dollond, made him entertain doubts concerning Newton's report, and induced him to have recourse to experiment.

He therefore cemented together two plates of glass at their edges, so as to form a prismatic vessel, when stopped at the ends; and the edge being turned downwards, he placed in it a glass prism, with one of its edges upwards, and filled up the vacancy with clear water; so that the refraction of the prism was contrary to that of the water, in order that a ray of light, transmitted through both these refracting media, might be affected by the difference only between the two refractions. As he found the water to refract more or less than the glass prism, he diminished or increased the angle between the glass plates, till he found the two contrary refractions to be equal; which he discovered by viewing an object through this double prism. For when it appeared neither raised or depressed, he was satisfied that the refractions were equal, and that the emergent and incident rays were parallel.

But according to the prevailing opinion, the object should have appeared of its natural colour; for if the difference of refrangibility had been equal in the two equal refractions, they would have rectified each other. This experiment, therefore, fully proved the fallacy of the received opinion, by showing the divergency of the light by the glass prism to be almost double of that by the water; for the image of the object was as much infected with the prismatic colours, as if it had been seen through a glass wedge only, whose refracting angle was near 30 degrees.

Mr. Dollond was convinced that if the refracting angle of the water vessel could have admitted of a sufficient increase, the divergency of the coloured rays would have been greatly diminished, or entirely rectified; and that there would have been a very great refraction without colour; but the inconvenience of so large an angle as that of the prismatic vessel must have been, to bring the light to an equal divergency with that of the glass prism whose angle was about 60 degrees, made it necessary to try some experiments of the same kind with smaller angles.

He, therefore, got a wedge of plate glass, the angle of which was only nine degrees; and using it in the same circumstances, he increased the angle of the water wedge, in which it was placed, till the divergency of the light by the water was equal to that by the glass; that is, till the image of the object, though considerably refracted by the excess of the refraction of the water, appeared quite free from any colours proceeding from the different refrangibility of the light; and as near as he could then measure, the refraction by the water was about $\frac{3}{4}$ of that by the glass.

As these experiments proved, that different substances caused the light to diverge very differently in proportion to their general refractive power, Mr. Dollond began to suspect that such a variety might possibly be found in different kinds of glass.

His next object, therefore, was to grind wedges of different kinds of glass, and apply them together; so that the refractions might be made in contrary directions, in order to discover whether the refraction and the divergency of the colours would vanish together.

From these experiments, which were not made till 1757, he discovered a difference far beyond his hopes in the refractive qualities of different kinds of glass, with respect to the divergency of colours. The yellow or straw-coloured kind, commonly called Venice glass, and the English crown glass, proved to be nearly alike in that respect; though, in general, the crown glass seemed to make light diverge less than the other. The common English plate glass made the light

diverge more; and the white crystal, or English flint glass, most of all.

He then examined the particular qualities of every kind of glass that he could obtain, to fix upon two kinds in which the difference of their dispersive powers should be the greatest; and he soon found these to be the crown glass and the white flint glass. He therefore ground one wedge of white flint, of about 25 degrees; and another of crown glass, of about 29 degrees; which refracted very nearly alike, but their power of making the colours diverge was very different. He then ground several others of crown glass to different angles, till he got one which was equal, with respect to the divergency of the light, to that in the white flint glass; for when they were put together, so as to refract in contrary directions, the refracted light was entirely free from colours. Then measuring the refraction of each wedge with these different angles, he found that of the white glass to be to that of the crown glass nearly as two to three: so that any two wedges made in this proportion, and applied together, that they might refract in a contrary direction, would transmit the light without any dispersion of the rays. He found also, that the sine of incidence in crown glass is to that of its general refraction as 1 to 1.53, and in flint glass as 1 to 1.583.

In order to apply these discoveries to the construction of telescopes, Mr. Dollond considered, that, in order to make two spherical glasses that should refract the light in contrary directions, the one must be concave and the other convex; and as the rays are to converge to a real focus, the excess of refraction must be in the convex lens. Also, as the convex glass is to refract the most, it appeared from his experiments, that it must be made of crown glass, and the concave of white flint glass. Farther, as the refractions of spherical glasses are in the inverse ratio of their focal distances, it follows, that the focal distances of the two glasses shall be inversely as the ratios of the refractions of the wedges; for being thus proportioned, every ray of light that passes through this combined glass, at whatever distance it may pass from its axis, will constantly be refracted, by the difference between two contrary refractions, in the proportion required; and therefore the different refrangibility of the light will be entirely removed.

The difficulties which occurred in the application of this reasoning to practice arose from the following circumstances. In the first place, The focal distances, as well as the particular surfaces, must be very nicely proportioned to the densities or refracting powers of the glasses, which are very apt to vary in the same sort of glass made at different times. Secondly, The centres of the two glasses must be placed truly in the common axis of the telescope, otherwise the desired effect will be in a great measure destroyed. And thirdly, The difficulty of forming the four surfaces of the lenses exactly spherical. At length, however, after numerous trials, he was able to construct refracting telescopes, with such apertures and magnifying powers, under limited lengths, as far exceeded any thing that had been produced before, representing objects with great distinctness, and in their natural colours.

As Mr. Dollond did not explain the method by which he determined the curvatures of his lenses, the celebrated M. Clairaut, who had begun to investigate this subject, endeavoured to reduce it to a complete theory, from which rules might be deduced, for the benefit of the practical optician.

With this view, therefore, he endeavoured to ascertain the refractive power of different kinds of glass, and also their property of dispersing the rays of light. For this purpose he made use of two prisms, as Mr. Dollond had done: but, instead of looking through them, he placed them in a dark room; and when the transmitted image of the sun was perfectly white, he concluded that the different refrangibility of the rays was corrected.

In order to ascertain more easily the true angles that prisms ought to have in order to destroy the effect of the difference of refrangibility, he constructed a prism which had one of its surfaces cylindrical, with several degrees of amplitude. By this means, without changing his prisms, he had the choice of an infinity of angles; among which, by examining the point of the curve surface, which, receiving the solar ray, gave a white image, he could easily find the true one. He also ascertained the proportion in which different kinds of glass separated the rays of light, by measuring, with proper precautions, the oblong image of the sun made by transmitting through them a beam of light.

In these experiments M. Clairaut was assisted by M. de Tournieres, and the results agreed with Mr. Dollond's in general; but whereas Mr. Dollond has made the dispersion of the rays in glass and in water to be as five to four (acknowledging, however, that he did not pretend to do it with exactness), these gentlemen, who took more pains, found it to be as three to two. For the theorems and problems deduced by M. Clairaut from these new principles of optics, with a view to the perfection of telescopes, we must refer the reader to Mem. Acad. Par. 1756, 1757.

The subject of achromatic telescopes was also investigated by the illustrious D'Alembert. This excellent mathematician proposed a variety of new constructions, the advantages and disadvantages of which he distinctly notes; at the same time that he points out several methods of correcting the errors to which these telescopes are liable: as by placing the object glasses, in some cases, at a small distance from one another, and sometimes by using eye glasses of different refractive powers; which is an expedient that does not seem to have occurred to any person before him. He even shows, that telescopes may be made to advantage, consisting of only one object glass, and an eye glass of a different refractive power. Some of his constructions have two or more eye glasses of different kinds of glass. This subject he considered at large in one of the volumes of his Opuscules Mathematiques. We have also three memoirs of M. D'Alembert upon this subject, among those of the French Academy, in the years 1764, 1765, and 1767.

The investigations of Clairaut and D'Alembert do not seem to have assisted the exertions of foreign artists. The telescopes made in England, according to no exact rule, as foreigners supposed, were greatly superior to any that could be made elsewhere, though under the immediate direction of those able calculators.

M. Euler, who first gave occasion to this in-

quiry, having persuaded himself, both by reasoning and calculation, that Mr. Dollond had discovered no new principle in optics, and yet not being able to controvert Mr. Short's testimony in favour of the achromatic telescopes, concluded that this extraordinary effect was partly owing to the crown glass not transmitting all the red light, which would otherwise have come to a different focus, and have distorted the image; but principally to his giving a just curvature to his glass, which he did not doubt would have produced the same effect if the lenses had all been made of the same kind of glass. At another time he imagined that the goodness of Mr. Dollond's telescopes might be owing to the eye glass. If my theory, says he, be true, this disagreeable consequence follows, that Mr. Dollond's object glasses cannot be exempt from the dispersion of colours; yet a regard to so respectable a testimony embarrasses me extremely, it being as difficult to question such express authority, as to abandon a theory which appears to me well founded, and to embrace an opinion which is as contrary to all the established laws of nature as it is strange and seemingly absurd. He even appeals to experiments made in a darkened room; in which he says, he is confident that Mr. Dollond's object-glasses would appear to have the same defects to which others are subject.

Not doubting, however, but that Mr. Dollond had made some improvement in the construction of telescopes, by the combination of glasses, he abandoned his former project, in which he had recourse to different media, and confined his attention to the correction of the errors which arise from the curvature of lenses. But while he was proceeding, as he imagined, upon the true principles of optics, he could not help expressing his surprise that Mr. Dollond should have been led to so important a discovery by reasoning in a manner quite contrary to the nature of things. At length, however, M. Euler was convinced of the reality and importance of Mr. Dollond's discoveries; and frankly acknowledges, that perhaps he should never have been brought to assent to it, had he not been assured by his friend M. Clairaut that the experiments of the English optician might be depended upon. The experiments of M. Zeiher, however, gave him the most complete satisfaction with respect to this subject. This gentleman demonstrated, that it is the lead in the composition of glass which produces the variation in its dispersive power; and, by increasing the quantity of lead in the mixture, he produced a kind of glass, which occasioned a much greater separation of the extreme rays than the flint glass which Mr Dollond had made use of.

From these new principles M. Euler deduces theorems concerning the combination of the lenses, and, in a manner similar to M. Clairaut and D'Alembert, points out methods of constructing achromatic telescopes.

While he was employed upon this subject, he informs us, that he received a letter from M. Zeiher, dated Petersburg, 30th of January, 1764, in which he gives him a particular account of the success of his experiments on the composition of glass; and that, having mixed minium and sand in different proportions, the result of the mean refraction and the dispersion of the rays varied according to the following table.

	Proportion of minium to flint.	Ratio of the mean refraction from air into glass.	Dispersion of the rays in comparison of crown glass.
I.	— 3 : 1	2028 : 1000	4800 : 1000
II.	— 2 : 1	1830 : 1000	3550 : 1000
III.	— 1 : 1	1787 : 1000	3259 : 1000
IV.	— $\frac{3}{4}$: 1	1732 : 1000	2207 : 1000
V.	— $\frac{1}{2}$: 1	1724 : 1000	1800 : 1000
VI.	— $\frac{1}{4}$: 1	1664 : 1000	1354 : 1000

From this table it is evident, that a greater quantity of lead not only produces a greater dispersion of the rays, but also increases the mean refraction. The first of these kinds of glass, which contains three times as much minium as flint, will appear very extraordinary; since hitherto no transparent substance has been known, whose refractive power exceeded the ratio of two to one, and since the dispersion occasioned by this glass is almost five times as great as that of crown glass, which could scarcely be believed by those who entertained any doubt concerning the same property in flint glass, the effect of which is three times as great as crown glass.

Here, however, M. Euler announces to us another discovery of M. Zeiher, no less surprising than the former, and which disconcerted all his schemes for reconciling the above-mentioned phenomena. As the six kinds of glass mentioned in the preceding table were composed of nothing but minium and flint, M. Zeiher happened to think of mixing alkaline salts with them, in order to give the glass a consistence more proper for dioptric uses: this mixture, however, greatly diminished the mean refraction, almost without making any change in the dispersion. After many trials, he is said to have obtained a kind of glass, which occasioned three times as great a dispersion of the rays as the common glass, at the same time that the mean refraction was only as 1.61 to 1.; though we have not heard that this kind of glass was ever used in the construction of telescopes.

Mr. Dollond was not the only optician who had the merit of discovering the achromatic telescope, as this instrument appears to have been constructed by a private gentleman—Mr. Chester More Hall. He observed that prisms of flint glass gave larger spectra than prisms of water, when the mean refraction was the same in both. He tried prisms of other glass, and found similar differences; and he applied this discovery to the same purposes as Mr. Dollond. These facts came out in a process raised at the instance of Watkins, optician, as also in a publication of Mr. Ramsden. There is, however, no evidence that Dollond stole the idea from Mr. Hall, or that they had not both claims to the discovery.

The best refracting telescopes, constructed on the principles of Mr. Dollond, are still defective, on account of that colour which, by the aberration of the rays, they give to objects viewed through them, unless the object glass be of small diameter. This defect philosophers have endeavoured to remove by various contrivances, and Boscovich has, in his attempts for this purpose, displayed

much ingenuity; but the philosopher whose exertions have been crowned with most success, and who has perhaps made the most important discovery in this science, is Dr. Robert Blair, professor of practical astronomy in the college of Edinburgh. By a judicious set of experiments, he has proved, that the quality of dispersing the rays in a greater degree than crown glass is not confined to a few media, but is possessed by a great variety of fluids, and by some of these in a most extraordinary degree. He has shown, that though the greater refrangibility of the violet rays than of the red rays, when light passes from any medium whatever into a vacuum, may be considered as a law of nature; yet in the passage of light from one medium into another, it depends entirely on the qualities of the media which of these rays shall be the most refrangible, or whether there shall be any difference in their refrangibility. In order to correct the aberration arising from difference of refrangibility among the rays of light, he instituted a set of experiments, by which he detected a very singular and important quality in the muriatic acid. In all the dispersive media hitherto examined, the green rays, which are the mean refrangible in crown glass, were found among the less refrangible; but in the muriatic acid, these same rays were found to make a part of the more refrangible. This discovery led to complete success in removing the great defect of optical instruments, viz. that dissipation or aberration of the rays which arises from their unequal refrangibility, and has hitherto rendered it impossible to converge all of them to one point either by single or opposite refractions. A fluid, in which the particles of marine acid and metalline particles hold a due proportion, at the same time that it separates the extreme rays of the spectrum much more than crown glass, refracts all the orders of the rays in the same proportion that glass does: and hence rays of all colours made to diverge by the refraction of the glass, may either be rendered parallel by a subsequent refraction in the confine of the glass and this fluid; or, by weakening the refractive density of the fluid, the refraction which takes place in the confine of it and glass may be rendered as regular as reflection, without the least colour whatever. The doctor has a telescope, not exceeding 15 inches in length, with a compound object glass of this kind, which equals in all respects, if it does not surpass, the best of Dollond's 42 inches long. See Phil. Trans. Edin. vol. iii.

We shall conclude the history of the discoveries concerning refraction, with some account of the refraction of the atmosphere.—Tables of refraction have been calculated by Mr. Lambert, with a view to correct inaccuracies in determining the altitudes of mountains geometrically. The observations of Mr. Lambert go upon the supposition that the refractive power of the atmosphere is invariable: but as this is by no means the case, his rules must be considered as true only for the mean state of the air.

Dr. Nettleton observed a remarkable variety in the refractive power of the atmosphere, which demonstrates how little we can depend upon the calculated heights of mountains, when the observations are made with an instrument, and when the refractive power of the air is to be taken into the account. Being desirous to learn, by observation, how far the mercury would descend in the barometer at any given elevation, he proposed to measure the height of some of their highest hills; but when he attempted it, he found his observation so much disturbed by refraction, that he could obtain no certain result. Having measured one hill of a considerable height, in a clear day, and observed the mercury at the bottom and at the top, he found, that about 19 feet or more were required to make the mercury fall $\frac{1}{10}$th of an inch; but afterwards, repeating the experiment, when the air was rather gross and hazy, he found the small angles so much increased by refraction as to make the hill much higher than before. He afterwards frequently made observations at his own house, by pointing a quadrant to the tops of some neighbouring hills, and observed that they would appear higher in the morning before sunrise, and also late in the evening, than at noon in a clear day, by several minutes. In one case the elevations of the same hill differed more than 30 minutes.

M. Euler considered the refractive power of the atmosphere, as affected by different degrees of heat and elasticity; in which he shows, that its refractive power, to a considerable distance from the zenith, is sufficiently near the proportion of the tangent of that distance, and that the law of refraction follows the direct ratio of the difference marked by the thermometer; but when stars are in the horizon, the changes are in a ratio somewhat greater than this, more especially on account of the variation in the heat.

As the density of the atmosphere varies with its altitude, and as the irregular curvature of the earth causes a constant change in the inclination of the strata through which any ray of light passes to the eye, the refraction cannot be obtained from the density of the atmosphere, and the angular direction of the refracted ray. By comparing astronomical with meteorological observations, however, the celebrated M. La Place has given a complete solution of this very important problem.

The phenomena known by the names of mirage, looming, and fata morgana, have been traced to irregularities of refractions arising from accidental changes in the temperature of the atmosphere. From the rarefaction of the air near the surface of water, buildings, or the earth itself, a distant object seen through this rarefied air sometimes appears depressed instead of raised by refraction; at other times it appears both elevated and depressed, so that the object seems double, and sometimes triple, one of the images being in an inverted position. This subject is much indebted to the researches of the ingenious Dr. Wollaston, who has imitated these natural phenomena by viewing objects through the rarefied air contiguous to a red-hot poker, or through a saline or saccharine solution with water and spirit of wine floating upon its surface. This branch of optics has also been well illustrated by Mr. Vince and Mr. Huddart, in different volumes of the philosophical transactions.

Sect. II. *Discoveries concerning the Reflection of Light.*

The followers of Plato were acquainted with the equality between the angles of incidence and reflection; and it is probable that they discovered this, by observing a ray of the sun reflected from standing water, or some other polished body; or from attending to the images of objects reflected by such surfaces. If philosophers paid any attention to this phenomenon, they could not but perceive, that, if the ray fell nearly perpendicular upon

such a surface, it was reflected near the perpendicular; and if it fell obliquely, it was reflected obliquely: and observations upon these angles, the most rude and imperfect, could not fail to convince them of their equality, and that the incident and reflected rays were in the same plane.

Aristotle was sensible that it is the reflection of light from the atmosphere which prevents total darkness after the sun sets, and in places where he does not shine in the day time. He was also of opinion, that rainbows, halos, and mock suns, were occasioned by the reflection of the sunbeams in different circumstances, by which an imperfect image of his body was produced, the colour only being exhibited, and not his proper figure. The image, he says, is not single, as in a mirror; for each drop of rain is too small to reflect a visible image, but the conjunction of all the images is visible.

Without inquiring any farther into the nature of light or vision, the ancient geometers contented themselves with deducing a system of optics from two facts, the rectilineal progress of light, and the equality of the angles of incidence and reflection. The treatise of optics ascribed to Euclid is employed in determining the apparent size and figure of objects, from the angle which they subtend at the eye; and the apparent place of the image of an object reflected from a polished mirror. This place he fixes at the point where the reflected ray meets a perpendicular to the mirror drawn through the object. But this work is so imperfect and inaccurate, that it does not seem to be the production of Euclid.

It appears from Pliny and Lactantius, that burning glasses were known to the ancients. In one of the plays of Aristophanes, indeed, a person is introduced who proposes to destroy his adversary's papers by means of this instrument; and there is reason to believe that the Romans had a method of lighting their sacred fire by means of a concave speculum. It seems indeed to have been known A. C. 433, that there is an increase of heat in the place where the rays of light meet, after reflection from a concave mirror. The burning power of concave mirrors is noticed by the author of the work ascribed to Euclid. If we give any credit to what some ancient historians are said to have written concerning the exploits of Archimedes, we shall be induced to think that he constructed some very powerful burning mirrors: but nothing being said of other persons making use of his inventions, the whole account is very doubtful. It is allowed, however, that this eminent geometer did write a treatise on the subject of burning mirrors, which has not descended to our times.

B. Porta supposes that the burning mirrors of the ancients were parabolic and made of metal. It follows from the properties of this curve, that all the rays which fall upon it, parallel to its axis, will meet in the same point at the focus. Consequently, if the vertex of the parabola be cut off, it will make a convenient burning mirror. In some drawings of this instrument the frustum is so small as to look like a ring. With an instrument of this kind, it is thought, that the Romans lighted their sacred fire, and that with a similar mirror Archimedes burnt the Roman fleet; using a lens, to throw the rays parallel, when they had been brought to a focus; or applying a smaller parabolic mirror for this purpose.

The nature of reflection was, however, very far from being understood. Even lord Bacon, who made much greater advances in physics than his predecessors, supposed it possible to see the image reflected from a looking-glass, without seeing the glass itself; and to this purpose he quotes a story of friar Bacon, who is reported to have apparently walked in the air between two steeples, and which was thought to have been effected by reflection from glasses while he walked upon the ground.

Vitellio had endeavoured to show that it is possible, by means of a cylindrical convex speculum, to see the images of objects in the air, out of the speculum, when the objects themselves cannot be seen. But from his description of the apparatus, it will be seen that the eye was to be directed towards the speculum placed within a room, while the object and the spectator were without it. But as no such effect can be produced by a convex mirror, Vitellio must have been under some deception with respect to his experiment.

B. Porta says, that this effect may be produced by a plain mirror only; and also by the combination of a plain and a concave mirror.

Kircher also speaks of the possibility of exhibiting these pendulous images, and supposes that they are reflected from the dense air: but the most perfect and pleasing deception, depending upon the images in the air, is one of which this writer gives a particular account in his Ars Magna Lucis et Umbræ, p. 783. In this case the image is placed at the bottom of a hollow polished cylinder, by which means it appears like a real solid substance, suspended within the mouth of the vessel.

It was Kepler who first discovered, that the apparent places of objects seen by reflecting mirrors depended upon the angle which the rays of light, issuing from the extreme part of an object, make with one another after reflection.

Mr. Boyle made some curious observations concerning the reflecting powers of differently coloured substances. In order to shew that snow shines by a borrowed and not by a native light, he placed a quantity of it in a room, from which all foreign light was excluded, and found that it was completely invisible. To try whether white bodies reflect more light than others, he held a sheet of white paper in a sunbeam admitted into a darkened room; and observed that it reflected much more light than a paper of any other colour, a considerable part of the room being enlightened by it. To show that white bodies reflect the rays outwards, he adds, that common burning glasses require a long time to burn or discolour white paper; that the image of the sun was not so well defined upon white paper as upon black; that when he put ink upon the paper, the moisture would be quickly dried up, and the paper, which he could not burn before, would presently take fire;—and that by exposing his hand to the sun, with a thin black glove upon it, it would be suddenly and more considerably heated, than if he held his naked hand to the rays, or put on a glove of thin white leather.

To prove that black is the reverse of white, with respect to its property of reflecting the rays of the sun, he procured a large piece of black marble, ground into the form of a large concave speculum, and found that the image of the sun reflected from it was far from offending or dazzling his eyes, as it would have done from an other speculum; and though this was large, he could not for a long time set a piece of wood on

its with it; though a far less speculum, of the same form and of a more reflecting substance, would presently have made it flame.

To satisfy himself still farther with respect to this subject, he took a tile; and having made one half of its surface white and the other black, he exposed it to the summer sun. Having let it lie there some time, he found, that while the whitened part remained cool, the black part was very hot. He sometimes left part of the tile of its native red; and, after exposing the whole to the sun, observed that this part grew hotter than the white, but not so hot as the black part.

A remarkable property of lignum nephriticum (a species of guilandina) was first observed by Kircher. Mr. Boyle has described this lignum nephriticum as a whitish kind of wood, which was brought from Mexico, and which had been thought to tinge water of a green colour only; but he says that he found it to communicate all kinds of colours. If an infusion of this wood be put into a glass globe, and exposed to a strong light, it will be as colourless as pure water; but if it be carried into a place a little shaded, it will be a beautiful green. In a place still more shaded, it will incline to red; and in a very shady place, or in an opaque vessel, it will be green again.

Mr. Boyle first distinctly noted the two very different colours which this remarkable tincture exhibits by transmitted and reflected light. If it be held directly between the light and the eye, it will appear tinged (excepting the very top of it, where a sky-coloured circle sometimes appears) almost of a golden colour, except the infusion be too strong; in which case it will be dark or reddish, and requires to be diluted with water. But if it be held from the light, so that the eye be between the light and the phial, it will appear of a deep lively blue colour; as will also the drops, if any lie on the outside of the glass.

When a little of this tincture was poured upon a sheet of white paper, and placed in a window where the sun shone upon it, he observed, that if he turned his back upon the sun, the shadow of any body projected upon the liquor would not be all dark, like other shadows; but that part of it would be curiously coloured, the edge of it next the body being almost of a lively golden colour, and the more remote part blue.

Observing that this tincture, if it were too deep, was not tinged in so beautiful a manner, and that the impregnating virtue of the wood did, by frequent infusion in fresh water, gradually decay, he conjectured that the tincture contained much of the essential salt of the wood; and to try whether the subtle parts, on which the colour depended, were volatile enough to be distilled, without dissolving their texture, he applied some of it to the gentle heat of a lamp furnace; but he found all that came over was as limpid and colourless as rock water, while that which remained behind was of so deep a blue, that it was only in a very strong light that it appeared of any colour.

Having sometimes brought a round long-necked phial, filled with this tincture, into a darkened room, into which a beam of the sun was admitted by a small aperture; and holding the phial sometimes near the sunbeams, and sometimes partly in them and partly out of them, changing also the position of the glass, and viewing it from several parts of the room, it exhibited a much greater variety of colours than it did in an enlightened room. Besides the usual colours, it was red in some places and green in others, and within were intermediate colours produced by the different mixtures of light and shade.

It was not only in this tincture of lignum nephriticum that Mr. Boyle perceived the difference between reflected and transmitted light. He observed it even in gold, though no person explained the cause of these appearances before sir Isaac Newton. He took a piece of leaf gold, and holding it betwixt his eye and the light, observed that it did not appear of a golden colour, but of a greenish blue. He also observed the same change of colour by candle-light; but the experiment did not succeed with a leaf of silver.

The constitution of the atmosphere and of the sea, we shall find, by more recent observations, to be similar to that of this infusion; for the blue rays, and others of a faint colour, do not penetrate so far into them as the red, and others of stronger colour.

The first distinct account of the colours exhibited by thin plates of various substances is to be found among the observations of Mr. Boyle. To show that colours may be made to appear or vanish, where there is no accession or change either of the sulphureous, the saline, or the mercurial principle of bodies, he observes, that all chemical essential oils, as also good spirit of wine, being shaken till they rise in bubbles, appear of various colours; which immediately vanish when the bubbles burst, so that a colourless liquor may be immediately made to exhibit a variety of colours, and lose them in a moment, without any change in its essential principles. He then mentions the colours that appear in bubbles of soap and water, and also in those of turpentine. He sometimes got glass blown so thin as to exhibit similar colours; and observes, that a feather, and also a black ribbon, held at a proper distance, between his eye and the sun, showed a variety of little rainbows, with very vivid colours, none of which were constantly to be seen in the same objects.

This subject was more carefully investigated by Dr. Hooke, who promised, at a meeting of the society on the 7th of March, 1672, to exhibit, at their next meeting, something which had neither reflection nor refraction, and yet was diaphanous. Accordingly he produced the famous coloured bubble of soap and water of which such use was afterwards made by sir Isaac Newton, but which Dr. Hooke and his contemporaries seem to have overlooked in Mr. Boyle's treatise on colours, though it was published nine years before. It is no wonder that so curious an appearance excited the attention of that inquisitive body, and that they should desire him to bring an account of it in writing at their next meeting.

By the help of a small glass pipe, there were blown several small bubbles, out of a mixture of soap and water. At first, they appeared white and clear; but, after some time, the film of water growing thinner, there appeared upon it all the colours of the rainbow: first, a pale yellow; then orange, red, purple, blue, green, &c. with the same series of colours repeated; in which it was farther observable, that the first and last series were very faint, and that the middlemost series were very bright. After these colours had passed through the changes above mentioned, the film of the bubble began to appear white again; and presently, in several parts of this second white film, there were seen several holes, which by degrees grew very large, several of them running into one another.

Dr. Hooke was the first who observed the beautiful colours that appear in thin plates of Muscovy

glass. With a microscope he could perceive that these colours were ranged in rings surrounding the white specks or flaws in this thin substance, that the order of the colours was the very same as in the rainbow, and that they were often repeated ten times. But the colours were disposed as in the outer rainbow. Some of them also were much brighter than others, and some of them very much broader. He also observed, that if there was a part where the colours were very broad, and conspicuous to the naked eye, they might be made, by pressing the part with the finger, to change places, and move from one part to another. Lastly, he observed, that if great care be used, this substance may split into plates of $\frac{1}{8}$ or $\frac{1}{4}$ of an inch in diameter, each of which will appear through a microscope to be uniformly adorned with some one vivid colour, and that these plates will be found upon examination to be of the same thickness throughout.

A phenomenon similar to this was noticed by lord Brereton, who at a meeting of the Royal Society in 1666, produced some pieces of glass taken out of a church window, both on the north and on the south side of it; they were all eaten in by the air, but the piece taken from the south side had some colours like those of the rainbow upon it, which the others on the north side had not. It cannot be doubted, but that in all these cases, the glass is divided into thin plates, which exhibit colours, upon the same principle with those which Dr. Hooke observed in the bubble of soap and water, and in the thin plate of glass, which we shall find more fully explained by sir Isaac Newton.

The enquiries of M. Bouguer concerning the reflection of light are worthy of particular notice. They are fully detailed in his Traité d'Optique, a posthumous work published by La Caille in 1760.

In order to compare different degrees of light, he always contrived to place the radiant bodies or other bodies illumined by them, in such a manner that he could view them distinctly at the same time; and he either varied the distances of these bodies or modified their light in some other way, till he could perceive no difference between them. Then, considering their different distances, or the other circumstances by which their light was affected, he calculated the proportion which they would have borne to each other at the same distance, or in the same circumstances.

To ascertain the quantity of light lost by reflection, he placed the mirror, or reflecting surface, B, pl. 122. fig. 2. on which the experiment was to be made, truly upright; and having taken two tablets, of precisely the same colour, or of an equal degree of whiteness, he placed them exactly parallel to one another at E and D, and threw light upon them by means of a lamp or candle, P, placed in a right line between them. He then placed himself so, that with his eye at A he could see the tablet E, and the image of the tablet D, reflected from the mirror B, at the same time; making them, as it were, to touch one another. He then moved the candle along the line ED, so as to throw more or less light upon either of them, till he could perceive no difference in the strength of the two lights that came to his eye. After this, he had nothing more to do than to measure the distances EP and DP, and then the intensity of the lights was as EP^2 to DP^2.

To find how much light is lost by oblique reflection, he took two equally polished plates, D and E, as fig. 3. and caused them to be enlightened by the candle P. While one of them, D, was seen at A, by reflection from B, placed in a position oblique to the eye, the other, E, was so placed, as to appear contiguous to it; and removing the plate E, till the light which it reflected was no stronger than that which came from the image D, seen by reflection at B, he estimated the quantity of light that was lost by this oblique reflection, by the squares of the distances of the two objects from the candle.

In order to ascertain the quantity of light lost by reflection with the greatest exactness, M. Bouguer introduced two beams of light into a darkened room, as by the apertures P and Q, fig. 4.; which he had so contrived, that he could place them higher and lower, and enlarge or contract them at pleasure; and the reflecting surface (as that of a fluid contained in a vessel) was placed horizontally at O, from which the light coming through the hole P, was reflected to R, upon the screen GH, where it was compared with another beam of light that fell upon S, through the hole Q; which he made so much less than P, as that the spaces S and R were equally illuminated; and by the proportion which the apertures P and Q bore to each other, he calculated what quantity of light was lost by the reflection at O.

It was necessary, he observes, that the two beams of light PO and QS (which he usually made 7 or 8 feet long) should be exactly parallel, that they might come from two points of the sky of the same altitude, and having precisely the same intensity of light. It was also necessary that the hole Q should be a little higher than P, in order that the two images should be at the same height, and near one another. It is no less necessary, he says, that the screen GH be exactly vertical, in order that the direct and reflected beams may fall upon it, with the same inclination; since, otherwise, though the two lights were perfectly equal, they would not illuminate the screen equally. This disposition, he says, serves to answer another important condition in these experiments; for the direct ray QS must be of the same length with the sum of the incident and reflected rays, PO and OR, in order that the quantity of light introduced into the room may be sensibly proportional to the sizes of the apertures.

Before we proceed to detail the other experiments of Bouguer, we shall notice some which were made previous to them by Buffon on the diminution of light by reflection, and the transmission of it to considerable distances through the air.

By receiving the light of the sun in a dark room, and comparing it with the same light of the sun reflected by a mirror, he found that at small distances, as four or five feet, about one half was lost by reflection.

When the distances were 100, 200, and 300 feet, he could hardly perceive that it lost any of its intensity by being transmitted through such a space of air.

He afterwards made the same experiments with candles, in the following manner: He placed himself opposite to a looking glass, with a book in his hand, in a dark room; and having one candle lighted in the next room, at the distance of about 40 feet, he had it brought nearer to him by degrees, till he could just distinguish the letters of the book, which was then 24 feet from the candle. He then received the light of the candle, reflected by the looking glass, upon his book, carefully excluding all the light that was reflected from any thing else; and he found that the distance of the book from the candle, including the distance

from the book to the looking glass (which was only half a foot) was in all 15 feet. He repeated the experiment several times, with nearly the same result; and therefore concluded, that the quantity of direct is to that of reflected light as 576 to 225; so that the light of five candles reflected from a plain mirror is about equal to that of two candles.

From these experiments it appeared, that more light was lost by reflection of the candles than of the sun, which M. Buffon thought was owing to this circumstance, that the light issuing from the candle diverges, and therefore falls more obliquely upon the mirror than the light of the sun, the rays of which are nearly parallel.

These experiments and observations of M. Buffon, though curious, are inferior to those of M. Bouguer, both in extent and accuracy.

In order to ascertain the difference in the quantity of light reflected by glass and polished metal, he used a smooth piece of glass one line in thickness, and found that when it was placed at an angle of 15 degrees with the incident rays, it reflected 628 parts of 1000 which fell upon it; at the same time that a metallic mirror, which he tried in the same circumstances, reflected only 561 of them. At a less angle of incidence much more light was reflected: so that at an angle of three degrees the glass reflected 700 parts, and the metal something less, as in the former case.

In the case of unpolished bodies, he found that a piece of white plaster, placed at an angle of 75°, within the incident rays, reflected $\frac{1}{275}$ part of the light that is received from a candle nine inches from it. White paper, in the same circumstances, reflected in the same proportion; but at the distance of three inches, they both reflected 150 parts out of 1000.

Proceeding to make farther observations on the subject of reflected light, he premises the two following theorems, which he demonstrates geometrically. 1. When the luminous body is at an infinite distance, and its light is received by a globe, the surface of which has a perfect polish, and absorbs no light, it reflects the light equally in all directions, provided it be received at a considerable distance. He excepts the place where the shadow of the globe falls: because this is no more than a single point, with respect to the immensity of the spherical surface which receives the light.

2. The quantity of light reflected in one certain direction will always be exactly the same, whether it be reflected by a very great number of small polished hemispheres, by a less number of larger hemispheres, or by a single hemisphere, provided they occupy the same base, or cover the same ground plan.

The use he proposes to make of these theorems is to assist him in distinguishing whether the light reflected from bodies be owing to the extinction of it within them, or whether the eminences which cover them have not the same effect as the small polished hemispheres above mentioned.

He begins with observing, that, of the light reflected from mercury, $\frac{1}{4}$ at least is lost, and that probably no substances reflect more than this. The rays were received at an angle of $11\frac{1}{2}$ degrees of incidence, that is measured from the surface of the reflecting body, and not from the perpendicular, which, he says, is what we are from this place to understand whenever he mentions the angle of incidence.

With regard to the quantities of light reflected at different angles of incidence, M. Bouguer found in general, that reflection is stronger at small angles of incidence, and weaker at large ones. The difference is excessive when the rays strike the surface of transparent substances, with different degrees of obliquity; but it is almost as great in some opaque substances, and it was almost more or less so in every thing that he tried. He found the greatest inequality in black marble, which, though not perfectly polished, yet with an angle of 3° 35′ of incidence, it reflected almost as well as quicksilver. Of 1000 rays which it received, it returned 600: but when the angle of incidence was 14°, it reflected only 156; when it was 30°, it reflected 51; and when it was 80°, it reflected only 23.

Similar experiments with metallic mirrors always give the differences much less considerable. The greatest was hardly ever an eighth or a ninth part of it, but they were always in the same way.

The great difference between the quantity of light reflected from the surface of water, at different angles of incidence, is truly surprising. M. Bouguer sometimes suspected, that, when the angles of incidence were very small, the reflection from water was even greater than from quicksilver; though he rather thought that it was scarcely so great. In very small angles, he says, that water reflects nearly $\frac{3}{4}$ of the direct light.

The light reflected from a lake is sometimes one-third or one-half, or even a greater proportion, of the light that comes directly from the sun, which is an addition to the direct rays of the sun that cannot fail to be very sensible. The direct light of the sun diminishes gradually as it approaches the horizon, while the reflected light at the same time grows stronger: so that there is a certain altitude of the sun, in which the united force of the direct and reflected light will be the greatest possible, and this he says is 12 or 13 degrees.

The light reflected from water at great angles of incidence is extremely small. M. Bouguer was assured, that, when the light was perpendicular, it reflected no more than the 37th part that quicksilver does in the same circumstances; for it did not appear that water reflects more than the 60th, or rather the 55th, part of perpendicular light. When the angle of incidence was 50°, the light reflected from the surface of water was about the 32d part of that which mercury reflected; and as the reflection from water increases as the angle of incidence diminishes, it was twice as strong in proportion at 39°; for it was then the 16th part of the quantity reflected from mercury.

In order to procure a common standard by which to measure the proportion of light reflected from various fluid substances, he selected water as the most commodious; and partly by observation and calculation he drew up the following table of the quantity of light reflected from its surface at different angles of incidence.

Angles of incidence.	Rays reflected of 1000.	Angles of incidence.	Rays reflected of 1000.
$\frac{1}{2}$	721	$17\frac{1}{2}$	178
1	692	20	145
$1\frac{1}{2}$	669	25	97
2	639	30	65
$2\frac{1}{2}$	614	40	34
5	501	50	22
$7\frac{1}{2}$	409	60	19
10	333	70	18
$12\frac{1}{2}$	271	80	18
15	211	90	18

In the same manner, he constructed the following table containing the quantity of light reflected from the looking-glass not quicksilvered.

Angles of incidence.	Rays reflected of 1000.	Angles of incidence.	Rays reflected of 1000.
$2\frac{1}{2}$	584	30	112
5	543	40	57
$7\frac{1}{2}$	474	50	34
10	412	60	27
$12\frac{1}{2}$	356	70	25
15	299	80	25
20	222	90	25
25	157		

When water floats upon mercury there will be two images of any object seen by reflection from them, one at the surface of the water, and the other at that of the quicksilver. In the largest angles of incidence, the image at the surface of the water will disappear, which will happen when it is about a 60th or an 80th part less luminous than the image at the surface of the quicksilver. Depressing the eye, the image on the water will grow stronger, and that on the quicksilver weaker in proportion; till at last, the latter will be incomparably weaker than the former, and at an angle of about 10 degrees they will be equally luminous. According to the table, $\frac{333}{1000}$ of the incident rays are reflected from the water at this angle of 10 degrees. At the surface of the mercury they were reduced to 500; and of these, part being reflected back upon it from the under surface of the water, only 333 remained to make the image from the mercury.

It has been frequently observed, that there is a remarkably strong reflection into water, with respect to rays issuing from the water; and persons under water have seen images of things in the air in a manner peculiarly distinct and beautiful. In order to account for these facts, M. Bouguer observes that from the smallest angles of incidence, to a certain number of degrees, the greatest part of the rays are reflected, perhaps, in as great a proportion as at the surface of metallic mirrors, or of quicksilver; while the other part, which does not escape into the air, is extinguished or absorbed; so that the surface of the transparent body appears opaque on the inside. If the angle of incidence be increased only a few degrees, the strong reflection ceases altogether, a great number of rays escape into the air, and very few are absorbed. As the angle of incidence is farther increased, the quantity of the light reflected becomes less and less; and when it is near 90 degrees, almost all the rays escape out of the transparent body, its surface losing almost all its power of reflection, and becoming nearly as transparent as when the light falls upon it from without.

This property belonging to the surfaces of transparent bodies, of absorbing the rays of light, is truly remarkable, and, as there is reason to believe, had not been noticed by any person before M. Bouguer.

That all the light is reflected at certain angles of incidence from air into denser substances had frequently been noticed, especially in glass prisms; so that Newton made use of one of them, instead of a mirror, in the construction of his reflecting telescope. If a beam of light fall upon the air from within these prisms, at an angle of 10, 20, or 30 degrees, the effect will be nearly the same as at the surface of quicksilver, one-fourth or one-third of the rays being extinguished, and two-thirds or three-fourths reflected. This property retains its full force as far as an angle of 49° 49', (the proportion of the sines of the refraction being 31 and 20,) but if the angle of incidence be increased but one degree, the quantity of light reflected inwards suddenly decreases, and a great part of the rays escape out of the glass, so that the surface becomes suddenly transparent.

All transparent bodies have the same property, with this difference, that the angle of incidence at which the strong reflection ceases, and at which the light which is not reflected is extinguished, is greater in some than in others. In water this angle is about 41° 32'; and in every medium it depends so much on the invariable proportion of the sine of the angle of refraction to the sine of the angle of incidence, that this law alone is sufficient to determine all the phenomena of this new circumstance, at least as to this accidental opacity of the surface.

When M. Bouguer proceeded to measure the quantity of light reflected by these internal surfaces at great angles of incidence, he had to struggle with many difficulties; but by using a plate of crystal, he found, that at an angle of 75 degrees, this internal reflection diminished the light 27 or 28 times; and as the external reflection at the same angle diminished the light only 26 times, it follows that the internal reflection is a little stronger than the other.

Repeating these experiments with the same and different pieces of crystal, he sometimes found the two reflections to be equally strong; but, in general, the internal was the stronger.

Resuming his observations on the diminution of light, occasioned by the reflection of opaque bodies obliquely situated, he compared it with the appearances of similar substances which reflected the light perpendicularly. Using pieces of silver made very white, he found, that, when one of them was placed at an angle of 75 degrees with respect to the light, it reflected only 640 parts out of 1000 He then varied the angle, and also used white plaster and fine Dutch paper, and drew up the following table of the proportion of the light reflected from each of those substances at certain angles.

Angles of incidence.	Quantity of light reflected from Silver.	Plaster.	Dutch Paper.
90	1000	1000	1000
75	802	762	971
60	640	640	743
45	455	529	507
30	319	352	332
15	209	194	203

Supposing the asperities of opaque bodies to consist of very small planes, it appears from these observations, that there are fewer of them in those bodies which reflect the light at small angles of incidence than at greater. None of them had their roughness equivalent to small hemispheres, which would have dispersed the light equally in all directions; and, from the data in the preceding table, he deduces mathematically the number of the planes that compose those surfaces, and that are inclined to the general surface at the angles above-mentioned, supposing that the whole surface

contains 1000 of them that are parallel to itself, so as to reflect the light perpendicularly, when the luminous body is situated at right angles with respect to it. His conclusions reduced to a table, corresponding to the preceding, are as follow:

Inclinations of the small surfaces with respect to the large one.	The distribution of the small planes that constitute the asperities of the opaque surface in the		
	Silver.	Plaster.	Paper.
0	1000	1000	1000
15	777	736	737
30	554	554	545
45	333	374	358
60	161	176	166
75	53	50	52

These variations in the number of little planes, he expresses in the form of a curve; and afterwards shows, geometrically, what would be the effect if the bodies were enlightened in one direction, and viewed in another. Upon this subject he has several curious theorems and problems; but for these we must refer to the work itself.

Since the planets are more luminous at their edges than at their centres, he concludes, that the bodies which form them are constituted in a manner different from ours; particularly that their opaque surfaces consist of small planes, more of which are inclined to the general surface than they are in terrestrial substances; and that there are in them an infinity of points, which have exactly the same splendour.

M. Bouguer next proceeds to ascertain the quantity of surface occupied by the small planes of each particular inclination, from considering the quantity of light reflected by each, allowing those that have a greater inclination to the common surface to take up proportionably less space than those which are parallel to it. And comparing the quantity of light that would be reflected by small planes thus disposed, with the quantity of light that was actually reflected by the three substances above-mentioned, he found that plaster, notwithstanding its extreme whiteness, absorbs much light; for that, of 1000 rays falling upon it, of which 166 or 167 ought to be reflected at an angle of 77°, only 67 are in fact returned; so that 100 out of 167 were extinguished, that is, about three-fifths.

With respect to the planets, Bouguer concludes that of 300,000 rays which the moon receives, 172,000, or perhaps 204,100, are absorbed.

Having considered the surfaces of bodies as consisting of planes only, he observes that each small surface, separately taken, is extremely irregular, some of them really concave, and others convex; but in reducing them to a middle state, they are to be regarded as planes. Nevertheless he considers them as planes only with respect to the reception of the rays; for as they are almost all curves, and as, besides this, many of those whose situation is different from others contribute to the same effects, the rays always issue from an actual or imaginary focus, and after reflection always diverge from another.

The experiments of Lambert, related in his Photometria, have laid open to us many curious observations concerning the natural history of light. He was the first who determined that a radiating surface emits its light with nearly the same intensity in all directions, so that every portion of it appears equally bright to an observer placed in any direction.

We are obliged to Mr. Melville for some ingenious observations on the manner in which bodies are heated by light. He observes, that, as each colorific particle of an opaque body must be somewhat moved by the reflection of the particles of light, when it is reflected backwards and forwards between the same particles, it is manifest that they must likewise be agitated with a vibratory motion, and the time of a vibration will be equal to that which light takes up in moving from one particle of a body to another adjoining. This distance, in the most solid opaque bodies, cannot be supposed greater than $\frac{1}{12000}$th of an inch, which space light describes in the $\frac{1}{12,000,000,000,000}$th of a second. With so rapid a motion, therefore, may the internal parts of bodies be agitated by the influence of light, as to perform 125,000,000,000,000 vibrations, or more, in a second of time.

The arrival of different particles of light at the surface of the same colorific particle, in the same or different rays, may disturb the regularity of its vibrations, but will evidently increase their frequency, or raise still smaller vibrations among the parts which compose those particles; whence the intestine motion will become more subtle, and more thoroughly diffused. If the quantity of light admitted into the body be increased, the vibrations of the particles must likewise increase in magnitude and velocity, till at last they may be so violent, as to make all the component particles dash one another to pieces by their mutual collision; in which case, the colour and texture of the body must be destroyed.

Since there is no reflection of light but at the surface of a medium, the same gentleman observes, that the greatest quantity of rays, though crowded into the smallest space, will not of themselves produce any heat. Hence it follows, that the portion of air which lies in the focus of the most potent speculum, is not at all affected by the passage of light through it, but continues of the same temperature with the ambient air; though any opaque body, or even any transparent body denser than air, when put in the same place, would, in an instant, be intensely heated.

The easiest way to be satisfied of this truth experimentally is, to hold a hair, or a piece of down, immediately above the focus of a lens or speculum, or to blow a stream of smoke from a pipe horizontally over it; for if the air in the focus were hotter than the surrounding fluid, it would continually ascend on account of its rarefaction, and thereby sensibly agitate those slender bodies. Or a lens may be so placed as to form its focus within a body of water, or some other transparent substance, the heat of which may be examined from time to time with a thermometer; but care must be taken, in this experiment, to hold the lens as near as possible to the transparent body, lest the rays, by falling closer than ordinary on its surface, should warm it more than the common sunbeams. See Priestley on Vision.

The attempts of the Abbé Nollet to fire inflammable substances by the concentration of the solar rays, have a near relation to the present subject. He attempted to fire liquid substances, but he was not able to do it either with spirit of wine, olive oil, oil of turpentine, or ether; and though he could fire sulphur, yet he could not succeed with Spanish wax, rosin, black pitch, or suet. He both threw the focus of these mirrors upon the sub-

stances themselves, and also upon the fumes that rose from them; but the only effect was, that the liquor boiled, and was dispersed in vapour or very small drops. When linen rags, and other solid substances, were moistened with any of these inflammable liquids, they would not take fire till the liquid was dispersed in a copious fume; so that the rags thus prepared were longer in burning than those that were dry.

M. Beaume, who assisted M. Nollet in some of these experiments, observed farther, that the same substances which were easily fired by the flame of burning bodies, could not be set on fire by the contact of the hottest bodies that did not actually flame. Neither ether nor spirit of wine could be fired with a hot coal, or even red-hot iron, unless they were of a white heat.

By the help of optical principles, and especially by observations on the reflection of light, Mr. Melville demonstrated that bodies which seem to touch one another are not always in actual contact. Upon examining the volubility and lustre of drops of rain that lie on the leaves of colewort, and some other vegetables, he found that the lustre of the drop is produced by a copious reflection of light from the flattened part of its surface contiguous to the plant. He found also, that when the drop rolls along a part which has been wetted, it immediately loses all its lustre, the green plant being then seen clearly through it; whereas, in the other case, it is hardly to be discerned.

From these two observations, he concluded, that the drop does not really touch the plant, when it has the mercurial appearance, but is suspended in the air at some distance from it by a repulsive force. For there could not be any copious reflection of white light from its under surface, unless there were a real interval between it and the surface of the plant.

If that surface were perfectly smooth, the under surface of the drop would be so likewise, and would therefore show an image of the illuminating body by reflection, like a piece of polished silver; but as it is considerably rough, the under surface becomes rough likewise, and thus by reflecting the light copiously in different directions, assumes the brilliant hue of unpolished silver.

It being thus proved by an optical argument, that the drop is not really in contact with the leaf, it may easily be conceived whence its volubility arises, and why it leaves no moisture where it rolls.

Before we conclude the history of the observations concerning the reflection of light, we must not omit to take notice of two singular miscellaneous observations. Baron Alexander Funk, visiting some silver mines in Sweden, observed that, in a clear day, it was as dark as pitch below ground, in the eye of a pit, at 60 or 70 fathoms deep; whereas, in a cloudy or rainy day, he could even see to read at the depth of 106 fathoms. He imagined that it arose from this circumstance, that when the atmosphere is full of clouds, light is reflected from them into the pit in all directions, and that thereby a considerable proportion of the rays are reflected perpendicularly upon the earth; whereas, when the atmosphere is clear, there are no opaque bodies to reflect the light in this manner, at least in a sufficient quantity; and rays from the sun itself can never fall perpendicularly in that country.

The other observation was that of the ingenious Mr. Grey. He took a piece of stiff brown paper, and pricking a small hole in it, he held it at a little distance before him; when, applying a needle to his eye, he was surprised to see the point of it inverted. The nearer the needle was to the hole, the more it was magnified, but the less distinct; and if it was so held, that its image was near the edge of the hole, its point seemed crooked. From these appearances he concluded, that these small holes, or something in them, produce the effects of concave speculums; and from this circumstance he took the liberty to call them aërial speculums.

This method of accounting for the inverted image of the pin is evidently erroneous; for the same effect is produced when the small aperture is formed of two semi-apertures at different distances from the eye, or when a small opening is made in the pigment on a piece of smoked glass. We have found indeed that the same phenomenon will appear, if, instead of looking at a hole in a piece of paper, we view a small luminous point so that it is expanded by indistinct vision into a circular image of light. The pin always increases in magnitude in proportion to its distance from the luminous point.

Sect. III. *Discoveries concerning the Inflection of Light.*

This property of light was not discovered till about the middle of the 17th century. The person who first made the discovery was father Grimaldi; at least he first published an account of it in his treatise De lumine, coloribus, et iride, printed in 1666. Dr. Hooke, however, laid claim to the same discovery, though he did not make his observations public till six years after Grimaldi.

Dr. Hooke having darkened his room, admitted a beam of the sun's light through a very small hole in a brass plate. This beam spreading itself, formed a cone, the vertex of which was in the hole, and the base was on a paper, so placed as to receive it at some distance. In the image of the sun, thus painted on the paper, he observed that the middle was much brighter than the edges, and that there was a kind of dark penumbra about it, of about a 16th part of the diameter of the circle; which he ascribed to a property of light, that he promised to explain. Having observed this, at the distance of about two inches from the former he let in another cone of light; and receiving the bases of them, at such a distance from the holes that the circles intersected each other, he observed that there was not only a darker ring, encompassing the lighter circle, but a manifest dark line or circle, which appeared even where the limb of the one interfered with that of the other.

In the light thus admitted, he held an opaque body so as to intercept the light that entered at a hole in the window shutter, and was received on the screen. In these circumstances, he observed, that the shadow of the opaque body (which was a round piece of wood, not bright or polished) was all over somewhat enlightened, but more especially towards the edge. In order to show that this light was not produced by reflection, he admitted the light through a hole burnt in a piece of pasteboard, and intercepted it with a razor which had a very sharp edge; but still the appearances were the very same as before; so that he concluded that they were occasioned by some new property of light.

He diversified this experiment, by placing the razor so as to divide the cone of light into two parts, and placing the paper so that none of the enlightened part of the circle fell upon it, but only the shadow of the razor; and, to his great surprise, he observed what he calls a very brisk

and visible radiation striking down upon the paper, of the same breadth with the diameter of the lucid circle. This radiation always struck perpendicularly from the line of shadow, and, like the tail of a comet, extended more than 10 times the breadth of the remaining part of the circle. He found, wherever there was a part of the interposed body higher than the rest, that, opposite to it, the radiation of light into the shadow was brighter, as in the figure; and wherever there was a notch or gap in it, there would be a dark stroke in the half-enlightened shadow. From all these appearances, he concluded, that there is a deflection of light, differing both from reflection and refraction, and seeming to depend on the unequal density of the constituent parts of the ray, whereby the light is dispersed from the place of condensation, and rarefied or gradually diverged into a quadrant; that this deflection is made towards the superficies of the opaque body perpendicularly; that those parts of the diverged radiations which are deflected by the greatest angle from the straight or direct radiations are the faintest, and those that are deflected by the least angles are the strongest; that rays cutting each other in one common aperture do not make the angles at the vertex equal; that colours may be made without refraction; that the diameter of the sun cannot be truly taken with common sights; that the same rays of light, falling upon the same point of an object, will turn into all sorts of colours, by the various inclinations of the object; and that colours begin to appear when two pulses of light are blended so well, and so near together, that the sense takes them for one.

We shall now proceed to give an account of the discoveries of father Grimaldi. Having introduced a ray of light through a very small hole, AB, fig. 6, into a darkened room, he observed that the light was diffused in the form of a cone, the base of which was CD; and that if any opaque body, FE, was placed in this cone of light, at a considerable distance from the hole, and the shadow received upon a piece of white paper, the boundaries of it were not confined within GH, or the penumbra IL, occasioned by the light proceeding from different parts of the aperture, and of the disk of the sun, but extended to MN: at this he was very much surprised, as he found that it was broader than it ought to have been made by rays passing in right lines by the edges of the object.

But the most remarkable circumstance in this appearance was, that upon the lucid part of the base, CM and ND, streaks of coloured light were plainly distinguished, each being terminated by blue on the side next the shadow, and by red on the other; and though these coloured streaks depended in some measure on the size of the aperture AB, because they could not be made to appear if it was large, yet he found that they were not limited either by it, or by the diameter of the sun's disk.

He farther observed, that these coloured streaks were not all of the same breadth, but grew narrower as they receded from the shadow, and were each of them broader the farther the shadow was received from the opaque body, and also the more obliquely the paper on which they were received was held with respect to it. He never observed more than three of these streaks.

To give a clearer idea of these coloured streaks, he drew the representation of them, exhibited in fig. 7, in which NMO represents the largest and most luminous streak, next to the dark shadow X. In the space in which N is placed there was no distinction of colour, but the space MM was blue, and the space OO on the other side of it was red.

The second streak QPR was narrower than the former; and of the three parts of which it consisted, the space P had no particular colour, but QQ was a faint blue, and RR a faint red. The third streak, TSV, was exactly similar to the two others, but narrower than either of them, and the colour still fainter.

These coloured streaks he observed to lie parallel to the shadow of the opaque body; but when it was of an angular form, they did not make the same acute angles, but were bent into a curve, the outermost being rounder than those that were next the shadow, as is represented in fig. 8. If it was an inward angle, as DCH, the coloured streaks, parallel to each other, of the two sides crossed without obliterating one another; only the colours were thus rendered either more intense or mixed.

Within the shadow itself, Grimaldi sometimes perceived coloured streaks, similar to those abovementioned on the outside of the shadow. Sometimes he saw more of them, and sometimes fewer; but for this purpose it was necessary to have strong light, and to make the opaque body long and moderately broad. A hair, for instance, or a fine needle, did not answer so well as a thin and narrow plate: and the streaks were most distinguishable when the shadow was taken at the greatest distance; though the light grew fainter in the same proportion.

The numbers of these streaks increased with the breadth of the plate. They were at least two, and sometimes four, if a thicker plate were made use of. But, with the same plate, more or fewer streaks appeared, in proportion to the distance at which the shadow was received; but they were broader when they were few, and narrower when there were more of them; and they were all much more distinct when the paper was held obliquely.

These coloured streaks, like those on the outside of the shadow, were bent in an arch, round the acute angles of the shadow, as they are represented in fig. 9. At this angle also, as at D, other shorter lucid streaks were visible, bent in the form of a plume, as they are drawn betwixt D and C, each bending round and meeting again in D. These angular streaks appeared, though the plate or rod was not wholly immersed in the beam of light, but the angle of it only; and they increased in number with the breadth of the plate. If the plate was very thin, the coloured streaks bent round from the opposite sides, and met one another as at B.

In order to obtain a more satisfactory proof, that rays of light really bend, in passing by the edges of bodies, he admitted a beam of light into a dark room, as before; and, at a great distance from it, he fixed a plate EF, pl. 123, fig. 1. with a small aperture, GH, which admitted only a part of the beam of light, and found that when the light transmitted through this plate was received at some distance upon a white paper, the base IK was considerably larger than it could possibly have been made by rays issuing in right lines through the two apertures. Grimaldi generally made the aperture CD $\frac{4}{300}$ or $\frac{1}{100}$ part of a foot, and the second aperture, GH, $\frac{11}{300}$ or $\frac{12}{100}$; and the distances DG and GN, were at least 12 feet. The observation was made about mid-day in the summer time, when the atmosphere was free from all vapours.

Grimaldi also made the same experiment that has been recited from Dr. Hooke, in which two

beams of light, entering a dark room by two small apertures near one another, projected cones of light, which, at a certain distance, in part coincided; and he particularly observed, that the dark boundaries of each of them were visible within the lucid ground of the other.

To these discoveries of Grimaldi, we shall subjoin an additional observation of Dechales; who found, that if a piece of polished metal, with small scratches in it, be exposed to the beams of the sun in a darkened room, it will reflect the rays streaked with colours in the direction of the scratches; as will appear, if the reflected light be received upon a piece of white paper. That these colours are not produced by refraction, he says, is manifest: for if the scratches be made upon glass, the effect will be the same; and in this case, if the light had been refracted at the surface of the glass, it would have been transmitted through it. From these and many other observations, he concluded, that colour does not depend upon the refraction of light only, nor upon a variety of other circumstances, which he particularly enumerates, but upon the intensity of the light only.

We shall here give an account of a phenomenon of vision observed by M. de la Hire, as being connected with the subject of this section. When we look at a candle, or any luminous body, with our eyes nearly shut, rays of light are extended from it in several directions, to a considerable distance, like the tails of comets. This appearance exercised the sagacity of Descartes and Rohault, as well as of De la Hire; but all these philosophers seem to have been mistaken with regard to its cause. Descartes ascribed this effect to certain wrinkles in the surface of the humours of the eyes. Rohault says, that when the eye-lids are nearly closed, the edges of them act like convex lenses. But De la Hire observes, that the moisture on the surface of the eye, adhering partly to the eye itself, and partly to the edge of the eye-lid, makes a concave mirror, and so disperses the rays at their entrance into the eye. The true account of the phenomenon, however, is this: there are three different kinds of radiations distinctly visible; the most brilliant, which diverge directly from the candle, are formed by the refraction of the light of the candle through the moisture that lubricates the eye, and which is brought opposite the pupil by one of the eye-lids. Another kind of radiation, which appears at a distance from the candle in the form of small luminous specks, is produced by reflection from the part of the eye-lid in which the lashes are inserted. The third kind of radiation is horizontal, and is caused by the inflection of the light in passing between the eye-lashes.

The experiments of Grimaldi and Hooke were repeated and extended by sir Isaac Newton, and were in some measure explained by that distinguished philosopher.

He made in a piece of lead a small hole the 42d part of an inch in diameter. Through this hole he let into his dark chamber a beam of the sun's light; and found, that the shadows of hairs, and other slender substances, placed in it, were considerably broader than they would have been if the rays of light had passed by those bodies in right lines. He therefore concluded that they must have passed as they are represented in pl. 123, fig. 2, in which X represents a section of the hair, and AB, ab, &c. rays of light passing by at different distances, and then falling upon the wall GQ. Since when the paper which receives the rays is at a great distance from the hair, the shadow is broad, it must follow, that the hair acts upon the rays at some considerable distance from it, the action being strongest on those rays which are at the least distance, and growing weaker and weaker on those which are farther off, as is represented in this figure; and hence it comes to pass that the shadow of the hair is much broader in proportion to the distance of the paper from the hair when it is nearer than when it is at a greater distance.

By wetting a polished plate of glass, and laying the hair in the water upon the glass, and then laying another polished plate of glass upon it, so that the water might fill up the space between the glasses, he found that the shadow at the same distance was as big as before, so that this breadth of shadow must proceed from some other cause than the refraction of the air.

The shadows of all bodies placed in this light were bordered with three parallel fringes of coloured light, of which that which was nearest to the shadow was the broadest and most luminous, while that which was farthest from it was the narrowest, and so faint as to be scarcely visible. It was difficult to distinguish these colours, unless when the light fell very obliquely upon some smooth white body, so as to make them appear much broader than they would otherwise have done; but in these circumstances the colours were plainly visible, and in the following order. The first or innermost fringe was violet, and deep blue next the shadow, light blue, green, and yellow in the middle, and red without. The second fringe was almost contiguous to the first, and the third to the second; and both were blue within, and yellow and red without; but their colours were very faint, especially those of the third. The colours, therefore, proceeded in the following order from the shadow: violet, indigo, pale blue, green, yellow, red; blue, yellow, red; pale blue, pale yellow, and red. The shadows made by scratches and bubbles in polished plates of glass were bordered with the like fringes of coloured light.

Measuring these fringes and their intervals with the greatest accuracy, he found the former to be in the progression of the numbers 1, $\sqrt{\frac{1}{3}}$, $\sqrt{\frac{1}{5}}$, and their intervals to be in the same progression with them, that is, the fringes and their intervals together to be nearly in continual progression of the numbers, 1, $\sqrt{\frac{1}{2}}$, $\sqrt{\frac{1}{3}}$, $\sqrt{\frac{1}{4}}$, $\sqrt{\frac{1}{5}}$.

Having made the aperture three-fourths of an inch in diameter, and admitted the light as formerly, sir Isaac placed, at the distance of two or three feet from the hole, a sheet of pasteboard, black on both sides; and in the middle of it he made a hole about one-fourth of an inch square, and behind the hole he fastened to the pasteboard the blade of a sharp knife, to intercept some part of the light which passed through the hole. The planes of the pasteboard and blade of the knife were parallel to each other, and perpendicular to the rays; and when they were so placed that none of the light fell on the pasteboard, but all of it passed through the hole to the knife, and there part of it fell upon the blade of the knife, and part of it passed by its edge, he let that part of the light which passed fall on a white paper, two or three feet beyond the knife, and there he saw two streams of faint light shoot out both ways from the beam of light into the shadow. But because the sun's direct light, by its brightness upon the paper, obscured these faint streams, so that he could scarcely see them, he made a little hole in the midst of the paper for that light to pass through and fall on a black cloth behind it; and then he saw the two streams

plainly. They were similar to one another, and pretty nearly equal in length, breadth, and quantity of light. Their light, at that end which was next to the sun's direct light, was pretty strong for the space of about one-fourth of an inch, or one-half of an inch, and gradually decreased till it became insensible.

The whole length of either of these streams, measured upon the paper, at the distance of 3 feet from the knife, was about 6 or 8 inches; so that it subtended an angle, at the edge of the knife, of about 10 or 12, or at most 14, degrees. Yet sometimes he thought he saw it about 3 or 4 degrees farther; but with a light so very faint, that he could hardly perceive it. This light he suspected might, in part at least, arise from some other cause than the two streams. For, placing his eye in that light, beyond the end of that stream which was behind the knife, and looking towards the knife, he could see a line of light upon its edge; and that not only when his eye was in the line of the streams, but also when it was out of that line, either towards the point of the knife, or towards the handle. This line of light appeared contiguous to the edge of the knife, and was narrower than the light of the innermost fringe, and narrowest when his eye was farthest from the direct light; and therefore seemed to pass between the light of that fringe and the edge of the knife; and that which passed nearest the edge seemed to be most bent.

He then placed another knife by the former, so that their edges might be parallel, and look towards one another, and that the beam of light might fall upon both the knives, and some part of it pass between their edges. In this situation he observed, that when the distance of their edges was about the 400th of an inch, the stream divided in the middle, and left a shadow between the two parts. This shadow was so dark, that all the light which passed between the knives seemed to be bent to the one hand or the other; and as the knives still approached each other, the shadow grew broader and the streams shorter next to it, till, upon the contact of the knives, all the light vanished.

Hence sir Isaac concluded, that the light which is least bent, and which goes to the inward ends of the streams, passes by the edges of the knives at the greatest distance; and this distance, when the shadow began to appear between the streams, was about the 800th of an inch; and the light which passed by the edges of the knives at distances still less and less, was more and more faint, and went to those parts of the streams which were farther from the direct light; because, when the knives approached one another till they touched, those parts of the stream vanish last which were farthest from the direct line.

In the experiment of one knife only, the coloured fringes did not appear; but, on account of the breadth of the hole in the window, became so broad as to run into one another, and, by joining, to make one continual light in the beginning of the streams; but in the last experiment, as the knives approached one another, a little before the shadow appeared between the two streams, the fringes began to appear on the inner ends of the streams, on either side of the direct light; three on one side, made by the edge of one knife, and three on the other side made by the edge of the other knife. They were the most distinct when the knives were placed at the greatest distance from the hole in the window, and became still more distinct by making the hole less; so that he could sometimes see a faint trace of a fourth fringe beyond the three above mentioned; and as the knives approached one another, the fringes grew more distinct and larger, till they vanished; the outermost vanishing first, and the innermost last. After they were all vanished, and the line of light in the middle between them was grown very broad, extending itself on both sides into the streams of light described before, the above mentioned shadow began to appear in the middle of this line, and to divide it along the middle into two lines of light, and increased till all the light vanished. This enlargement of the fringes was so great, that the rays which went to the innermost fringe seemed to be bent about 20 times more when the fringe was ready to vanish, than when one of the knives was taken away.

From both these experiments Newton concluded, that the light of the first fringe passed by the edge of the knife at a distance greater than the 800th of an inch; that the light of the second fringe passed by the edge of the knife at a greater distance than the light of the first fringe, and that of the third at a greater distance than that of the second; and that the light of which the streams above mentioned consisted passed by the edges of the knives at less distances than that of any of the fringes.

He then got the edges of two knives ground straight, and fixed their points into a board, so that their edges might contain a rectilinear angle. The distance of the edges of the knives from one another, at four inches from the angular point, was the 8th of an inch; so that the angle contained by their edges was about 1° 54′. The knives being thus fixed, he placed them in a beam of the sun's light let into his darkened chamber, through a hole the 42d of an inch wide, at the distance of 10 or 15 feet from the hole; and he let the light which passed between their edges fall very obliquely on a smooth white ruler, at the distance of ½ inch, or an inch, from the knives; and there he saw the fringes made by the two edges of the knives run along the edges of the shadows of the knives, in lines parallel to those edges, without growing sensibly broader, till they met in angles equal to the angle contained by the edges of the knives; and where they met and joined, they ended, without crossing one another. But if the ruler was held at a much greater distance from the knives, the fringes, where they were farther from the place of their meeting, were a little narrower, and they became something broader as they approached nearer to one another, and after they met they crossed one another, and then became much broader than before.

From these observations he concluded, that the distance at which the light composing the fringes passed by the knives were not increased or altered by the approach; and that the knife which was nearest to any ray determined which way the ray should be bent, but that the other knife increased the bending.

When the rays fell very obliquely upon the ruler, at the distance of ⅛ of an inch from the knives, the dark line between the first and second fringe of the shadow of one knife, and the dark line between the first and second fringe of the shadow of the other knife, met one another, at the distance of ⅕ of an inch from the end of the

light which passed between the knives, where their edges met; so that the distance of the edges of the knives, at the meeting of the dark lines, was the 160th of an inch; and one half of that light passed by the edge of one knife, at a distance not greater than the 320th part of an inch, and, falling upon the paper, made the fringes of the shadow of that knife; while the other half passed by the edge of the other knife, at a distance not greater than the 320th part of an inch, and, falling upon the paper, made the fringes of the shadow of the other knife. But if the paper was held at a distance from the knives greater than one-third of an inch, the dark lines above mentioned met at a greater distance that one-fifth of an inch from the end of the light which passed between the knives, at the meeting of their edges; so that the light which fell upon the paper where those dark lines met passed between the knives, where their edges were farther distant than the 160th of an inch. For at another time, when the two knives were 8 feet 5 inches from the little hole in the window, the light which fell upon the paper where the above mentioned dark lines met passed between the knives, where the distance between their edges was, as in the following table, at the distances from the paper noted.

Distances of the paper from the knives in inches.	Distance between the edges of the knives in thousandth parts of an inch.
1½	0,012
3⅓	0,020
8⅚	0,034
32	0,057
96	0,081
131	0,087

From these observations he concluded, that the light which forms the fringes upon the paper is not the same light at all distances of the paper from the knives; but that when the paper is held near the knives, the fringes are made by light which passes by the edges of the knives at a less distance, and is more bent than when the paper is held at a greater distance from the knives.

When the fringes of the shadows of the knives fell perpendicularly upon the paper, at a great distance from the knives, they were in the form of hyperbolas, of the following dimensions. Let CA, CB, (fig. 3.) represent lines drawn upon the paper, parallel to the edges of the knives; and between which all the light would fall if it suffered no inflection. DE is a right line drawn through C, making the angles ACD, BCE, equal to one another, and terminating all the light which falls upon the paper, from the point where the edges of the knives meet. Then *e i s*, *f k t*, and *g l v*, will be three hyperbolic lines, representing the boundaries of the shadow of one of the knives, the dark line between the first and second fringes of that shadow, and the dark line between the second and third fringes of the same shadow. Also *x i p*, *y k q*, and *z l r*, will be three other hyperbolic lines, representing the boundaries of the shadow of the other knife, the dark line between the first and second fringes of that shadow, and the dark line between the second and third fringes of the same shadow. These three hyperbolas which are similar, and equal to the former, cross them in the points *i*, *k*, and *l*; so that the shadows of the knives are terminated, and distinguished from the first luminous fringes, by the lines *e i s* and *x i p*, till the meeting and crossing of the fringes; and then those lines cross the fringes in the form of dark lines terminating the first luminous fringes on the inside, and distinguishing them from another light, which begins to appear at *i*, and illuminates all the triangular space *i p* DE *s*, comprehended by these dark lines and the right line DE. Of these hyperbolas one asymptote is the line DE, and the other asymptotes are parallel to the lines CA and CB.

Before the small hole in the window Newton placed a prism, to form on the opposite wall the coloured image of the sun; and he found that the shadows of all bodies held in the coloured light, were bordered with fringes of the colour of the light in which they were held; he found also that those made in the red light were the largest, those made in the violet the least, and those made in the green of a middle bigness. The fringes with which the shadow of a man's hair were surrounded, being measured across the shadow, at the distance of six inches from the hair, the distance between the middle and most luminous part of the first or innermost fringe on one side of the shadow, and that of the like fringe on the other side of the shadow, was, in the full red light $\frac{1}{37.5}$ of an inch, and in the full violet $\frac{1}{46}$. The like distance between the middle and most luminous parts of the second fringes, on either side of the shadow, was in the full red light $\frac{1}{22}$ and in the violet $\frac{1}{27}$ of an inch; and these distances of the fringes held the same proportion at all distances from the hair, without any sensible variation.

From these observations it was evident, that the rays which formed the fringes in the red light, passed by the hair at a greater distance than those which made the like fringes in the violet; so that the hair in causing these fringes, acted alike upon the red light or least refrangible rays at a greater distance, and upon the violet or most refrangible rays at a less distance; and thereby occasioned fringes of different sizes, without any change in the colour of any sort of light.

It may therefore be concluded, that when the hair was held in the white beam of light, and cast a shadow bordered with three coloured fringes, those colours arose not from any new modifications impressed upon the rays of light by the hair, but only from the various inflections by which the several sorts of rays were separated from one another, which before separation, by the mixture of all their colours, composed the white beam of the sun's light; but, when separated, composed lights of the several colours which they are originally disposed to exhibit.

The person who first made any experiments similar to those of Newton on inflected light is M. Maraldi. His observations chiefly respect the inflection of light towards other bodies, whereby their shadows are partially illuminated.

He exposed in the light of the sun a cylinder of wood three feet long, and 6½ lines in diameter, when its shadow was every where equally black and well defined, even at the distance of 23 inches from it. At a greater distance the shadow appeared of two different densities; for its two extremities, in the direction of the length of the cylinder, were terminated by two dark strokes, a little more than a line in breadth. Within these

dark lines there was a faint light, equally dispersed through the shadow, which formed an uniform penumbra, much lighter than the dark strokes at the extremity, or than the shadow received near the cylinder. This appearance is represented in plate 123, fig. 4.

As the cylinder was removed to a greater distance from the paper, the two black lines continued to be nearly of the same breadth, and the same degree of obscurity; but the penumbra in the middle grew lighter, and its breadth diminished, so that the two dark lines at the extremity of the shadow approached one another, till at the distance of 60 inches, they coincided, and the penumbra in the middle entirely vanished. At a still greater distance a faint penumbra was visible; but it was ill defined, and grew broader as the cylinder was removed farther off, but was sensible at a very great distance.

Besides the black and dark shadow which the cylinder formed near the opaque body, a narrow and faint penumbra was seen on the outside of the dark shadow. And on the outside of this there was a tract more strongly illuminated than the rest of the paper.

The breadth of the external penumbra increased with the distance of the shadow from the cylinder, and the breadth of the tract of light on the outside of it was also enlarged; but its splendour diminished with the distance.

He repeated these experiments with three other cylinders of different dimensions; and from all of them he inferred, that every opaque cylindrical body, exposed to the light of the sun, makes a shadow which is black and dark to the distance of 38 to 45 diameters of the cylinder which forms it; and that, at a greater distance, the middle part begins to be illuminated in the manner described above.

In explaining these appearances, Maraldi supposes that the light which diluted the middle part of the shadow was occasioned by the inflection of the rays, which, bending inwards on their near approach to the body, did at a certain distance enlighten all the shadow, except the edges, which were left undisturbed. At the same time other rays were deflected from the body, and forming a strong light on the outside of the shadow, and which might at the same time contribute to dilute the outer shadow, though he supposed that penumbra to be occasioned principally by that part of the paper not being enlightened, except by a part of the sun's disk only, according to the known principles of optics.

The same experiments he made with globes of several diameters; but he found, that the shadows of the globes were not visible beyond 15 of their diameters; which he thought was owing to the light being inflected on every side of a globe, and consequently in such a quantity as to disperse the shadows sooner than in the case of the cylinders.

In repeating the experiments of Grimaldi and Newton, he observed that, besides the enlarged shadow of a hair, a fine needle, &c. the bright gleam of light that bordered it, and the three coloured fringes next to this enlightened part, when the shadow was at a considerable distance from the hair, the dark central shadow was divided in the middle by a mixture of light; and that it was not of the same density, except when it was very near the hair.

A bristle, at the distance of nine feet from the hole, made a shadow, which, being received at five or six feet from the object, he observed to consist of several streaks of light and shade. The middle part was a faint shadow, or rather a kind of penumbra, bordered by a darker shadow, and after that by a narrower penumbra, next to which was a light streak broader than the dark part; and next to the streak of light, the red, violet, and blue colours were seen as in the shadow of the hair.

A plate, two inches long, and about half a line broad, being fixed perpendicularly to the rays, at the distance of nine feet from the hole, a faint light was seen uniformly dispersed over the shadow, when it was received perpendicularly to it, and very near. The shadow of the same plate, received at the distance of two feet and a half, was divided into four narrow black streaks, separated by small lighter intervals equal to them. The boundaries of this shadow on each side had a penumbra, which was terminated by a very strong light, next to which were the coloured streaks of red, violet, and blue, as before. This is represented in plate 123, fig. 5.

The shadow of the same plate, at 4½ feet distance from it, was divided into two black streaks only, the two outermost having disappeared, as in fig. 6.; but these two black streaks which remained were broader than before, and separated by a lighter shade, twice as broad as one of the former black streaks, when the shadow was taken at 2½ feet. This penumbra in the middle had a tinge of red. After the two black streaks there appeared a pretty strong penumbra, terminated by the two streaks of light, which were now broad and splendid, after which followed the coloured streaks.

A second plate, 2 inches long and a line broad, being placed 14 feet from the hole, its shadow was received perpendicularly very near the plate, and was found to be illuminated by a faint light, equally dispersed, as in the case of the preceding plate. But being received at the distance of 13 feet from the plate, six small black streaks began to be visible, as in fig. 7. At 17 feet the black streaks were broader, more distinct, and more separated from the streaks that were less dark. At 42 feet, only two black streaks were seen in the middle of the penumbra, as in fig. 8. This middle penumbra between the two black streaks was tinged with red. Next to the black streaks there always appeared the streaks of light, which were broad, and the coloured streaks next to them. At the distance of 72 feet, the appearances were the same as in the former situation, except that the two black streaks were broader, and the interval between them, occupied by the penumbra, was broader also, and tinged with a deeper red. With plates from ½ line to 2 lines broad, he could not observe any of the streaks of light, though the shadows were in some cases 56 feet from them.

The extraordinary size of the shadows of small substances M. Maraldi thought to be occasioned by the shadow from the enlightened part of the sky, added to that which was made by the light of the sun, and also to a vortex occasioned by the circulation of the inflected light behind the object.

Maraldi having made the preceding experiments upon single long substances, placed two of them so as to cross one another in a beam of the sun's light. The shadows of two hairs placed in this manner, and received at some distance from them, appear to be painted reciprocally one upon the

other, so that the obscure part of one of them was visible upon the obscure part of the other. The streaks of light also crossed one another, and the coloured streaks did the same.

He also placed in the rays of the sun a bristle and a plate of iron a line thick, so that they crossed one another obliquely; and when their shadows were received at the same distance, the light and dark streaks of the shadow of the bristle were visible so far as the middle of the shadow of the plate on the side of the acute angle, but not on the side of the obtuse angle, whether the bristle or the plate were placed next to the rays. The plate made a shadow sufficiently dark, divided into six black streaks; and these were again divided by as many light ones equal to them; and yet all the streaks belonging to the shadow of the bristle were visible upon it, as in fig. 9. To explain this appearance, he supposed that the rays of the sun glided a little along the bristle, so as to enlighten part of that which was behind the plate. But this seems to be an arbitrary and improbable supposition.

M. Maraldi also placed small globes in the solar light, admitted through a small aperture, and compared their shadows with those of the long substances, as he had done in the day-light, and the appearances were still similar. It was evident, that there was much more light in the shadows of the globes than in those of the cylinders, not only when they were both of an equal diameter, but when that of the globe was larger than that of the cylinder, and the shadows of both the bodies were received at the same distance. He also observed, that he could perceive no difference of light in the shadows of the plates which were a little more than one line broad, though they were received at the distance of 72 feet; but he could observe a difference of shades in those of the globes, taken at the same distance, though they were 2½ lines in diameter.

In order to explain the colours at the edges of these shadows, he threw some of the shadows upon others.

He threw the gleam of light, which always intervened between the colours and the darker part of the shadow, upon different parts of other shadows; and observed, that, when it fell upon the exterior penumbra made by another needle, it produced a beautiful sky-blue colour, almost like that which was produced by two blue colours thrown together. When the same gleam of light fell upon the deeper shadow in the middle, it produced a red colour.

He placed two plates of iron, each three or four lines broad, at a very small distance: and having placed them in the rays of the sun, and received their shadows at the distance of 15 or 20 feet from them, he saw no light between them but a continued shadow, in the middle of which were some parallel streaks of a lively purple, separated by other black streaks; but between them there were other streaks, both of a very faint green, and also of a pale yellow.

The subject of inflection was next investigated by M. Mairan: but he only endeavoured to explain the facts which were known, by the hypothesis of an atmosphere surrounding all bodies; and consequently making two reflections and refractions of the light that falls upon them, one at the surface of the atmosphere, and the other at that of the body. This atmosphere he supposed to be of a variable density and refractive power, like the atmosphere.

M. Du Tour thought the variable atmosphere superfluous, and attempted to account for all the phenomena by an atmosphere of an uniform density, and of a less refractive power than the air surrounding all bodies.

The white streaks mixed with the coloured ones he ascribed to small cavities in the surface of the pin; for they also changed their places when the pin was turned upon its axis.

He also found, that bodies of various kinds, and of different sizes, always produced fringes of the same dimensions.

Exposing two pieces of paper in the beam of light, so that part of it passed between two planes formed by them, M. Du Tour observed, that the edges of this light were bordered with two orange streaks. To account for them, he supposes, that the more refrangible of the rays are so refracted, that they do not reach the surface of the body: so that the red and orange light may be reflected from thence in the direction where the streaks will be formed; and, for the same reason, another streak of orange will be formed by the rays which enter the atmosphere on the other side of the chink. In a similar manner he accounts for the orange fringes at the borders of the white streaks, in the experiment of the hoop. He supposes, that the blue rays form the blue tinge observable in the shadows of some bodies. This, however, is mere trifling.

We may here make a general observation, applicable to all the attempts of philosophers to explain these phenomena by atmospheres. These attempts give no explanation whatever of the physical cause of the phenomena. A phenomenon is some individual fact or event in nature. We are said to explain it, when we point out the general fact in which it is comprehended, and show the manner in which it is so comprehended, or the particular modification of the general fact. Philosophy resembles natural history, having for its subject the events of nature; and its investigations are nothing but the classification of these events, or the arrangement of them under the general facts of which they are individual instances. In the present instance there is no general fact referred to. The atmosphere is a mere gratuitous supposition; and all that is done is to show a resemblance between the phenomena of inflection of light to what would be the phenomena were bodies surrounded with such atmospheres; and even in this point of view, the discussions of Mairan and Du Tour are extremely deficient. They have been satisfied with very vague resemblances to a fact observed in one single instance, and not sufficiently examined or described in that instance, namely, the refraction of light through the atmosphere of this globe.

The attempt is to explain how light is turned out of its direction by passing near the surface of bodies. This indicates the action of forces in a direction transverse to that of the light. Newton took the right road of investigation, by taking the phenomenon in its original simplicity, and attending merely to this, that the rays are deflected from their former course; and the sole aim of his investigation was to discover the laws, or the more general facts in this deflection. He deduced from the phenomena, that some rays are more deflected than others, and endeavoured to determine in what rays the deflections are most remarkable; and no experiment of M. Du Tour has shown, that he was mistaken in his modified assertion, that those rays are most inflected which pass nearest to the body. We say modified assertion; for Newton

points out with great sagacity many instances of alternate fits of inflection and deflection, and takes it for granted, that the law of continuity is observed in these phenomena, and that the change of inflection into deflection is gradual.

But these analogical discussions are eminently deficient in another respect: they are held out as mechanical explanations of the changes of motion observed in rays of light. When it shall be shown, that these are precisely such as are observed in refracting atmospheres, nothing is done towards deciding the original question, for the action of refracting atmospheres presents it in all its difficulties, and we must still ask how do these atmospheres produce this effect? no advance whatever is gained in science by thrusting in this hypothetical atmosphere; and Newton did wisely in attaching himself to the simple fact: and he thus gives us another step in science, by showing us a fact unknown before, viz. that the action of bodies on light is not confined to transparent bodies. He added another general fact to our former stock, that light as well as other matter is acted on at a distance: and thus he made a very important deduction, that reflection, refraction, and inflection, are probably brought about by the same forces.

M. le Cat has well explained a phenomenon of vision depending upon the inflection of light, which shows, that, in some cases objects by this means appear magnified. Looking at a distant steeple, when a wire of a less diameter than the pupil of his eye, was held near to it, and drawing it several times betwixt his eye and that object, he found, that, every time the wire passed before his pupil, the steeple seemed to change its place, and some hills beyond the steeple appeared to have the same motion, just as if a lens had been drawn betwixt his eye and them. He found also, that there was a position of the wire in which the steeple seemed not to have any motion, when the wire was passed before his eye, and in this case the steeple appeared less distinct and magnified. He then placed his eye in such a manner with respect to the steeple, that the rays of light by which he saw it must come very close to the edge of a window, where he had placed himself to make his observations; and passing the wire before his eye, he observed, that, when it was in the visual axis, the steeple appeared nearer to the window, on whichever side the wire was made to approach. He repeated this experiment, and always with the same result, the object being by this means magnified, and nearly doubled.

This phenomenon he explains by fig. 10. in which B represents the eye, A the steeple, and C a section of the wire. The black lines express the cone of light by which the natural image of the steeple A is formed, and which is much narrower than the diameter of the wire C, but the dotted lines include not only that cone of light, stopped and turned out of its course by the wire, but also more distant rays inflected by the wire, and thereby thrown more converging into the pupil; just as would have been the effect of the interposition of a lens between the eye and the object.

Sect. IV. *Discoveries concerning Vision.*

Maurolycus was the first who demonstrated that the crystalline humour of the eye is a lens which collects the light issuing from external objects, and converges them upon the retina. He did not, however, seem to be aware that an image of every visible object was thus formed upon the retina; though this seems hardly to have been a step beyond the discovery he had made. Montucla conjectures, that he was prevented from mentioning this part of the discovery by the difficulty of accounting for the upright appearance of objects. This discovery was made by Kepler; but he, too, was much puzzled with the inversion of the image upon the retina. The rectification of these images, he says, is the business of the mind; which, when it perceives an impression on the lower part of the retina, considers it as made by rays proceeding from the higher parts of objects, tracing the rays back to the pupil, where they cross one another. This is the true explanation of the difficulty, and is exactly the same as that which was lately given by Dr. Reid.

These discoveries concerning vision were completed by Scheiner. For, in cutting away the coats of the back part of the eyes of sheep and oxen, and presenting several objects before them, he saw their images distinctly painted upon the retina. He did the same with the human eye, and exhibited this experiment at Rome in 1625.

Scheiner took a good deal of pains to ascertain the density and refractive power of all the humours of the eye, by comparing their magnifying power with that of water or glass in the same form and circumstances. The result of his inquiries was, that the aqueous humour does not differ much from water in this respect, nor the crystalline from glass, and that the vitreous humour is a medium between both. He also traces the progress of the rays of light through all the humours, and after discussing every possible hypothesis concerning the seat of vision, he demonstrates that it is in the retina, and shows that this was the opinion of Alhazen, Vitellio, Kepler, and all the most eminent philosophers. He advances many reasons for this hypothesis, answers many objections to it, and, by a variety of arguments, refutes the opinion that the seat of vision is in the crystalline lens.

The subject of vision occupied the attention of Descartes. He explains the methods of judging of the magnitudes, situations, and distances of objects, by the direction of the optic axes, comparing it to a blind man's judging of the size and distance of an object, by feeling it with two sticks of a known length, when the hands in which he holds them are at a known distance from each other. He also remarks, that having been accustomed to judge of the situation of objects by their images falling on a particular part of the eye; if by any distortion of the eye they fall on a different place, we are apt to mistake their situation, or imagine one object to be two, in the same way as we imagine one stick to be two, when it is placed between two contiguous fingers laid across one another. The direction of the optic axes, he says, will not serve us beyond 15 or 20 feet, and the change of form of the crystalline not more than three or four feet. For he imagined that the eye conforms itself to different distances by a change in the curvature of the crystalline, which he supposed to be a muscle, the tendons of it being the ciliary processes. In another place, he says, that the change in the conformation of the eye is of no use to us for the purpose of judging of distances beyond four or five feet, and the angle of the optic axes not more than 100 or 200 feet. For this reason, he says, that the sun and moon are conceived to be much more nearly of the same size than they are in reality. White and luminous objects, he observes, appear larger than

others, and also the parts contiguous to those on which the rays actually impinge; and for the same reason, if the objects be small, and placed at a great distance, they will always appear round, the figure of the angles disappearing.

The celebrated Dr. Berkeley, bishop of Cloyne, published, in 1709, An Essay towards a New Theory of Vision, in which he solves many difficulties. He does not admit that it is by means of those lines and angles, which are useful in explaining the theory of optics, that different distances are estimated by the sense of sight; neither does he think that the mere direction of the optic axes or the greater or less divergency of the rays of light are sufficient for this purpose. "I appeal (says he) to experience, whether any one computes its distance by the bigness of the angle made by the meeting of the two optic axes; or whether he ever thinks of the greater or less divergency of the rays which arrive from any point to his pupil: nay, whether it be not perfectly impossible for him to perceive, by sense, the various angles wherewith the rays according to their greater or lesser divergency fall upon his eye." That there is a necessary connexion between these various angles, &c. and different degrees of distance, and that this connection is known to every person skilled in optics, he readily acknowledges; but "in vain (he observes) shall mathematicians tell me, that I perceive certain lines and angles, which introduce into my mind the various notions of distance, so long as I am conscious of no such thing." He maintains that distance, magnitude, and even figure, are the objects of immediate perception only by the sense of touch; and that when we judge of them by sight, it is from different sensations felt in the eye, which experience has taught us to be the consequence of viewing objects of greater or less magnitude, of different figures, and at different distances. These sensations, with the respective distances, figures, and magnitudes by which they are occasioned, become so closely associated in the mind long before the period of distinct recollection, that the presence of the one instantly suggests the other; and we attribute to the sense of sight those notions which are acquired by the sense of touch, and of which certain visual sensations are merely the signs or symbols, just as words are the symbols of ideas. Upon these principles he accounts for single and erect vision. Subsequent writers have made considerable discoveries in the theory of vision: and among them science is much indebted to Dr. Reid, Dr. Wells, Dr. T. Young, and others.

Sect. V. *Of Optical Instruments.*

Glass globes, and specula, seem to have been the only optical instruments known to the ancients. Alhazen gave the first hint of the invention of spectacles. From the writings of this author, together with the observations of Roger Bacon, it is not improbable that some monks gradually hit upon the construction of spectacles; to which Bacon's lesser segment was a nearer approach than Alhazen's larger one.

It is certain that spectacles were well known in the 13th century, and not long before. It is said that Alexander Spina, a native of Pisa, who died in 1313, happened to see a pair of spectacles in the hands of a person who would not explain them to him; but that he succeeded in making a pair for himself, and immediately made the construction public. It is also inscribed on the tomb of Salvinus Armatus, a nobleman of Florence, who died 1317, that he was the inventor of spectacles.

Though both convex and concave lenses were sufficiently common, yet no attempt was made to combine them into a telescope till the end of the 16th century. Descartes considers James Metius as the first constructor of the telescope: and says, that as he was amusing himself with mirrors and burning glasses, he thought of looking through two of his lenses at a time; and that happening to take one that was convex and another that was concave, and happening also to hit upon a pretty good adjustment of them, he found that by looking through them distant objects appeared very large and distinct. In fact, without knowing it, he had made a telescope.

Other persons say, that this great discovery was first made by John Lippersheim, a spectacle-maker at Middleburgh, or rather by his children; who were diverting themselves with looking through two glasses at a time, and placing them at different distances from one another. But Borellus, the author of a book entitled De vero telescopii inventore, gives this honour to Zacharias Joannides, i. e. Jansen, another spectacle-maker at the same place, who made the first telescope in 1590.

This ingenious mechanic had no sooner found the arrangement of glasses that magnified distant objects, than he enclosed them in a tube, and ran with his instrument to prince Maurice; who, immediately conceiving that it might be useful in his wars, desired the author to keep it a secret. But this was found impossible; and several persons in that city immediately applied themselves to the making and selling of telescopes. One of the most distinguished of these was Hans Laprey, called Lippersheim by Sirturus. Some person in Holland being very early supplied by him with a telescope, he passed with many for the inventor: but both Metius above-mentioned, and Cornelius Drebell of Alcmaar, in Holland, applied to the inventor himself in 1620; as also did Galileo and many others. The first telescope made by Jansen did not exceed 15 or 16 inches in length; but Sirturus, who says that he had seen it, and made use of it, thought it the best that he had ever examined.

Jansen directing his telescope to celestial objects, distinctly viewed the spots on the surface of the moon; and discovered many new stars, particularly seven pretty considerable ones in the Great Bear. His son, Joannes Zacharias, observed the lucid circle near the limb of the moon, from whence several bright rays seem to dart in different directions: and he says, that the full moon, viewed through this instrument, did not appear flat, but was evidently globular. Jupiter appeared round, and rather spherical; and sometimes he perceived two, sometimes three, and at other times even four small stars, a little above or below him; and, as far as he could observe, they performed revolutions round him.

There are some who say that Galileo was the inventor of telescopes; but he himself acknowledges, that he first heard of the instrument from a German; but, that being informed of nothing more than the effects of it, first by common report, and a few days after by a French nobleman, J. Badovere, at Paris, he himself discovered the construction, by considering the nature of refraction: and thus he had much more real merit than the inventor himself.

About April or May, in 1609, it was reported at Venice, where Galileo (who was professor of ma-

-thematics in the university of Padua) then happened to be, that a Dutchman had presented to count Maurice of Nassau a certain optical instrument, by means of which distant objects appeared as if they were near; but no farther account of the discovery had reached that place, though this was near 20 years after the first discovery of the telescope. Struck, however, with this account, Galileo returned to Padua, considering what kind of an instrument this must be. The night following, the construction occurred to him; and the day after, putting the parts of the instrument together, as he had previously conceived it; and notwithstanding the imperfection of the glasses that he could then procure, the effect answered his expectations, as he presently acquainted his friends at Venice, where, from several eminences, he showed to some of the principal senators of that republic a variety of distant objects, to their very great astonishment. When he had made farther improvements in the instrument, he made a present of one of them to the Doge, Leonardo Donati, and at the same time to all the senate of Venice; giving along with it a written paper, in which he explained the structure and wonderful uses that might be made of the instrument both by land and sea. In return for so noble an entertainment, the republic, on the 25th of August in the same year, more than tripled his salary as professor.

Galileo having amused himself for some time with the view of terrestrial objects, at length directed his tube towards the heavens; and found that the surface of the moon was diversified with hills and valleys, like the earth. He found that the milky way and *nebulæ* consisted of a collection of fixed stars, which, on account either of their vast distance, or extreme smallness, were invisible to the naked eye. He also discovered innumerable fixed stars dispersed over the face of the heavens, which had been unknown to the ancients; and examining Jupiter, he found him attended by four stars, which, at certain periods, performed revolutions round him.

This discovery he made in January 1610, new style; and continuing his observations the whole of February following, he published in the beginning of March an account of all his discoveries, in his Nuncius Sidereus, printed at Venice.

The extraordinary discoveries contained in the Nuncius Sidereus, which was immediately reprinted both in Germany and France, were the cause of much debate among the philosophers of that time; many of whom could not give any credit to Galileo's account, while others endeavoured to decry his discoveries as nothing more than mere illusions.

In the beginning of July, 1610, Galileo being still at Padua, and getting an imperfect view of Saturn's ring, imagined that the planet consisted of three parts; and therefore in the account which he gave of this discovery to his friends, he calls it planetam tergeminam.

Whilst he was still at Padua, he observed some spots on the face of the sun; but he did not choose at that time to publish his discovery; partly for fear of incurring more of the hatred of many obstinate Peripatetics; and partly in order to make more exact observations on this remarkable phenomenon, as well as to form some conjecture concerning the probable cause of it. He therefore contented himself with communicating his observations to some of his friends at Padua and Venice, among whom we find the name of father Paul. This delay, however, was the cause of this discovery being contested with him by the famous Scheiner, who likewise made the same observation in October 1611, and we suppose had anticipated Galileo in the publication of it.

In November following Galileo was satisfied, that from the September preceding, Venus had been continually increasing in bulk, and that she changed her phases like the moon. About the end of March 1611, he went to Rome, where he gratified the cardinals, and all the principal nobility, with a view of the new wonders which he had discovered in the heavens.

Twenty-nine years Galileo enjoyed the use of his telescope, continually enriching astronomy with his observations: but by too close an application to that instrument, and the detriment he received from the nocturnal air, his eyes grew gradually weaker, till in 1639 he became totally blind; a calamity which, however, neither broke his spirits, nor interrupted the course of his studies.

The first telescope that Galileo constructed magnified only three times; but presently after he made another which magnified 18 times; and afterwards, with great trouble and expence, he constructed one that magnified 33 times; and with this it was that he discovered the satellites of Jupiter and the spots of the sun.

The honour of explaining the rationale of the telescope is due to the celebrated Kepler. He made several discoveries relating to the nature of vision; and not only explained the theory of the telescope which he found in use, but also pointed out methods of constructing others of superior powers and more commodious application.

It was Kepler who first gave a clear explication of the effects of lenses, in converging and diverging the rays of a pencil of light. He showed that a plano-convex lens makes rays that were parallel to its axis, to meet at the distance of the diameter of the sphere of convexity; but that if both sides of the lens be equally convex, the rays will have their focus at the distance of the radius of the circle, corresponding to that degree of convexity. He did not, however, investigate any rule for the foci of lenses unequally convex. He only says, in general, that they will fall somewhere in the middle, between the foci belonging to the two different degrees of convexity. We owe this investigation to Cavalieri, who laid down the following rule: As the sum of both the diameters is to one of them, so is the other to the distance of the focus.

The principal effects of telescopes depend upon these simple principles, viz. That objects appear larger in proportion to the angles which they subtend at the eye; and the effect is the same whether the pencils of rays, by which objects are visible to us, come directly from the objects themselves, or from any place nearer to the eye, where they may have been converged so as to form an image of the object; because they issue again from those points where there is no real substance, in certain directions, in the same manner as they did from the corresponding points in the objects themselves.

In fact, therefore, all that is effected by a telescope is, first, to make such an image of a distant object, by means of a lens or mirror; and then to give the eye some assistance for viewing that image as near as possible: so that the angle which it shall subtend at the eye may be very large compared with the angle which the object itself would subtend in the same situation. This is done by means of an eye-glass, which so refracts the pencils of rays, that they may afterwards be brought

to their several foci by the humours of the eye. But if the eye was so formed as to be able to see the image with sufficient distinctness at the same distance without any eye-glass, it would appear to him as much magnified as it does to another person who makes use of a glass for that purpose, though he would not in all cases have so large a field of view.

If, instead of an eye-glass, an object be looked at through a small hole in a thin plate or piece of paper, held close to the eye, it may be viewed very near to the eye, and at the same distance the apparent magnitude of the object will be the same in both cases. For if the hole be so small as to admit but a single ray from every point of the object, these rays will fall upon the retina in as many other points, and make a distinct image. They are only pencils of rays, which have a sensible base, as the breadth of the pupil, that are capable, by their spreading on the retina, of producing an indistinct image. As very few rays, however, can be admitted through a small hole, there will seldom be light sufficient to view any object to advantage in this manner.

If no image be formed by the foci of the pencils without the eye, yet if, by the help of a concave eye-glass, the pencils of rays shall enter the pupil, just as they would have done from any place without the eye, the visual angle will be the same as if an image had actually been formed in that place. Objects will not appear inverted through this telescope, because the pencils which form the images of them only cross one another once, viz. at the object glass, as in natural vision they do in the pupil of the eye.

Such is the telescope that was first discovered and used by philosophers. The great inconvenience attending it is, that the field of view is exceedingly small. For since the pencils of rays enter the eye very much diverging from one another, but few of them can be intercepted by the pupil. This inconvenience increases with the magnifying power of the telescope; so that it is a matter of surprise how, with such an instrument, Galileo and others could have made such discoveries. No other telescope, however, than this, was so much as thought of for many years after the discovery. Descartes, who wrote 30 years after, mentions no others as actually constructed.

It is to the celebrated Kepler that we are indebted for the construction of what we now call the astronomical telescope. The rationale of this instrument is explained, and the advantages of it are clearly pointed out by this philosopher in his Catoptrics; but what is very surprising, he never actually reduced his theory into practice. Montucla conjectures that the reason why he did not make trial of this new construction was, his not being aware of the great increase of the field of view; so that being engaged in other pursuits, he might not think it of much consequence to take any pains about the construction of an instrument, which could do little more than answer the same purpose with those which he already possessed. He must also have foreseen, that the length of this telescope must have been greater in proportion to its magnifying power, so that it might appear to him to be upon the whole not quite so good a construction as the former.

The first person who actually made an instrument of Kepler's construction was father Scheiner, who has given a description of it in his Rosa Ursina, published in 1630. If, says he, you insert two such lenses in a tube, and place your eye at a convenient distance, you will see all terrestrial objects inverted, indeed, but magnified and very distinct, with a considerable extent of view. He afterwards subjoins an account of a telescope of a different construction, with two convex eye glasses, which again reverses the images, and makes them appear in their natural position. This disposition of the lenses had also been pointed out by Kepler, but had not been reduced to practice. This construction, however, answered the end very imperfectly; and father Rheita presently after discovered a better construction, using three eye-glasses instead of two.

The only difference between the Galilean and the astronomical telescope is, that the pencils by which the extremities of any object are seen in this case, enter the eye diverging; whereas, in the other, they enter it converging; but if the sphere of concavity in the eye-glass of the Galilean telescope be equal to the sphere of convexity in the eye-glass of another telescope, their magnifying power will be the same. The concave eye-glass, however, being placed between the object-glass and its focus, the Galilean telescope will be shorter than the other, by twice the focal length of the eye-glass. Consequently, if the length of the telescopes be the same, the Galilean will have the greater magnifying power.

Huygens was particularly eminent for his systematic knowledge of optics, and is the author of the chief improvements which have been made on all the dioptrical instruments till the discovery of the achromatic telescope. He was well acquainted with the theory of aberration arising from the spherical figure of the glasses, and has shown several ingenious methods of diminishing them by proper constructions of the eye-pieces. He first pointed out the advantages of two eye-glasses in the astronomical telescope and double microscope, and gave rules for this construction, which both enlarges the field and shortens the instrument. Mr. Dollond adapted his construction to the terrestrial telescope of De Rheita; and his five eye-glasses are nothing but the Huygenian eye-piece doubled. This construction has been too hastily given up by the artists of the present day for another, also of Mr. Dollond's, of four glasses.

The same father Rheita, to whom we are indebted for the construction of a telescope for land objects, invented a binocular telescope, which father Cherubin, of Orleans, afterwards endeavoured to bring into use. It consists of two telescopes fastened together, pointed to the same object. When this instrument is well fixed, the object appears larger, and nearer to the eye, when it is seen through both the telescopes, than through one of them only, though they have the very same magnifying power. But this is only an illusion, occasioned by the stronger impression made upon the eye, by two equal images, equally illuminated. This advantage, however, is counterbalanced by the inconvenience attending the use of it.

The first who distinguished themselves in grinding telescopic glasses were two Italians, Eustachio Divini at Rome, and Campani at Bologna, whose fame was much superior to that of Divini, or that of any other person of his time; though Divini himself pretended, that, in all the trials that were made with their glasses, his, of a great focal length, performed better than those of Campani, and that his rival was not willing to try them with equal eye-glasses. It is

generally supposed, however, that Campani really excelled Divini, both in the goodness and the focal length of his object-glasses. It was with telescopes made by Campani that Cassini discovered the nearest satellites of Saturn. They were made by the express order of Louis XIV. and were of 86, 100, and 136 Paris feet in focal length.

Campani sold his lenses for a great price, and took every possible method to keep his art of making them secret. His laboratory was inaccessible, till after his death; when it was purchased by pope Benedict XIV. who presented it to the academy called the Institute, established in that city; and by the account which M. Fougeroux has given of what he could discover from it, we learn, that (except a machine, which M. Campani constructed, to work the basons on which he ground his glasses) the goodness of his lenses depended upon the clearness of his glass, his Venetian tripoli, the paper with which he polished them, and his great skill and address as a workman. It was also the general opinion that he owed much of his reputation to the secrecy and air of mystery which he affected; and that he made a great number of object-glasses which he rejected, showing only those that were very good. He made few lenses of a very great focal distance; and having the misfortune to break one of 141 feet in two pieces, he took incredible pains to join the two parts together, which he did at length so effectually, that it was used as if it had been entire; but it is not probable that he would have taken so much pains about it, if, as he pretended, he could very easily have made another as good.

Sir Paul Neille, Dr. Hooke says, made telescopes of 36 feet, pretty good, and one of 50, but not of proportional goodness. Afterwards Mr. Reive, and then Mr. Cox, who were the most celebrated in England as grinders of optic glasses, made some good instruments of 50 and 60 feet focal length, and Mr. Cox made one of 100.

These, and all other telescopes, were far exceeded by an object-glass of 600 feet focus made by M. Auzout; but he was never able to manage it. Hartsoeker is even said to have made some of a still greater focal length; but this ingenious mechanic, finding it impossible to make use of object-glasses the focal distance of which was much less than this, when they were enclosed in a tube, contrived a method of using them without a tube, by fixing them at the top of a tree, a high wall, or the roof of a house.

Mr. Huygens, who was also an excellent mechanic, made considerable improvements on this contrivance of Hartsoeker's. He placed the object-glass at the top of a long pole, having previously enclosed it in a short tube, which was made to turn in all directions by means of a ball and socket. The axis of this tube he could command with a fine silken string, so as to bring it into a line with the axis of another short tube which he held in his hand, and which contained the eye-glass. In this method he could make use of object-glasses of the greatest magnifying power, at whatever altitude his object was, and even in the zenith, provided his pole was as long as his telescope; and to adapt it to the view of objects of different altitudes, he had a contrivance, by which he could raise or depress at pleasure a stage that supported his object-glass.

M. de la Hire made some improvement in this method of managing the object-glass, by fixing it in the centre of a board, and not in a tube; but as it is not probable that this method will ever be made use of, since the discovery of both reflecting and achromatic telescopes, which are now brought to great perfection, and have even micrometers adapted to them, we need not describe the apparatus.

Before leaving this subject, it must be observed, that M. Auzout, in a paper delivered to the Royal Society, observed, that the apertures which the object-glasses of refracting telescopes can bear with distinctness, are in the sub-duplicate ratio of their lengths; and upon this supposition he drew up a table of the apertures of object-glasses of a great variety of focal lengths, from 4 inches to 400 feet. Upon this occasion, however, Dr. Hooke observed, that the same glass will bear a greater or less aperture, according to the less or greater light of the object.

But all these improvements were diminished in value by the discovery of the reflecting telescope. For a refracting telescope, even of 1000 feet focus, supposing it possible to be made use of, could not be made to magnify with distinctness more than 1000 times; whereas a reflecting telescope, not exceeding 9 or 10 feet, will magnify 1200 times.

"It must be acknowledged," says Dr. Smith, "that Mr. James Gregory of Aberdeen was the first inventor of the reflecting telescope; but his construction is quite different from sir Isaac Newton's, and not nearly so advantageous."

According to Dr. Pringle, Mersennus was the man who entertained the first thought of a reflector. He certainly proposed a telescope with specula to the celebrated Descartes many years before Gregory's invention, though indeed in a manner so very unsatisfactory, that Descartes was so far from approving the proposal, that he endeavoured to convince Mersennus of its fallacy. Dr. Smith, it appears, had never perused the two letters of Descartes to Mersennus which relate to that subject.

Gregory, a young man of uncommon genius, was led to the invention, in trying to correct two imperfections of the common telescope: the first was its too great length, which made it less manageable; the second, the incorrectness of the image. Mathematicians had demonstrated, that a pencil of rays could not be collected in a single point by a spherical lens; and also, that the image transmitted by such a lens would be in some degree incurvated. These inconveniences he believed would be obviated by substituting for the object-glass a metallic speculum, of a parabolic figure, to receive the incident rays, and to reflect them towards a small speculum of the same metal; this again was to return the image to an eye-glass placed behind the great speculum, which for that purpose was to be perforated in its centre. This construction he published in 1663, in his Optica Promota. But as Gregory, by his own account, was endowed with no mechanical dexterity, nor could find any workman capable of constructing his instrument, he was obliged to give up the pursuit; and probably, had not some new discoveries been made in light and colours, a reflecting telescope would never more have been thought of.

At an early period of life, Newton had applied himself to the improvement of the telescope; but imagining that Gregory's specula were neither very necessary, nor likely to be executed, he began with prosecuting the views of Descartes,

who aimed at making a more perfect image of an object, by grinding lenses, not to the figure of a sphere, but to that of one of the conic sections. Whilst he was thus employed, three years after Gregory's publication, he happened to examine the colours, formed by a prism, and having by means of that simple instrument discovered the different refrangibility of the rays of light, he then perceived that the errors of telescopes arising from that cause alone, were some hundred times greater than those which were occasioned by the spherical figure of lenses. This circumstance forced, as it were, Newton to fall into Gregory's track, and to turn his thoughts to reflectors. "The different refrangibility of the rays of light (says he in a letter to Mr. Oldenburg, secretary to the Royal Society, dated Feb. 1672) made me take reflections into consideration; and finding them regular, so that the angle of reflection of all sorts of rays was equal to the angle of incidence, I understood that by their mediation optic instruments might be brought to any degree of perfection imaginable, providing a reflecting substance could be found which would polish as finely as glass, and reflect as much light as glass transmits, and the art of communicating to it a parabolic figure he also obtained. Amidst these thoughts I was forced from Cambridge by the intervening plague, and it was more than two years before I proceeded further."

It was towards the end of 1668, or in the beginning of the following year, when Newton being obliged to have recourse to reflectors, and not relying on any artificer for making his specula, set about the work himself, and early in the year 1672 completed two small reflecting telescopes. In these he ground the great speculum into the concave portion of a sphere; not but that he approved of the parabolic form proposed by Gregory, though he found himself unable to accomplish it. In the letter that accompanied one of these instruments which he presented to the society, he writes, "that though he then despaired of performing that work (to wit, the parabolic figure of the great speculum) by geometrical rules yet he doubted not but that the thing might in some measure be accomplished by mechanical devices."

Not less did the difficulty appear to find a metallic substance that would be of a proper hardness, have the fewest pores, and receive the smoothest polish; a difficulty which he deemed almost unsurmountable, when he considered, that every irregularity in a reflecting surface would make the rays of light stray five or six times more out of their due course, than similar irregularities in a refracting one. In another letter, written soon after, he informs the secretary, "that he was very sensible that metal reflects less light than glass transmits; but as he had found some metallic substances more strongly reflective than others, to polish better, and to be freer from tarnishing than others, so he hoped that there might in time be found out some substances much freer from these inconveniencies than any yet known." Newton therefore laboured till he found a composition that answered in some degree, and left it to those who should come after him to find a better. Huygens, one of the greatest geniuses of the age, and a distinguished improver of the refracting telescope, no sooner was informed by Mr. Oldenburg of the discovery, than he wrote in answer, "that it was an admirable telescope; and that Mr. Newton had well considered the advantage which a concave speculum had over convex glasses in collecting the parallel rays, which, according to his own calculation, was very great: hence that Mr. Newton could give a far greater aperture to that speculum than to an object-glass of the same focal length, and consequently produce a much greater magnifying power than by an ordinary telescope: besides, that by the reflector he avoided an inconvenience inseparable from object-glasses, which was the obliquity of both their surfaces, which vitiated the refraction of the rays that pass towards the side of the glass: again, that by the mere reflection of the metalline speculum there were not so many rays lost as in glasses, which reflected a considerable quantity by each of their surfaces, and besides intercepted many of them by the obscurity of their substance: that the main business would be, to find a substance for this speculum that would bear as good a polish as glass. Lastly, he believed that Mr. Newton had not omitted to consider the advantage which a parabolic speculum would have over a spherical one in this construction; but had despaired, as he himself had done, of working other surfaces than spherical ones with exactness." Huygens was not satisfied with thus expressing to the society his high approbation of the invention; but drew up a favourable account of the new telescope, which he published in the Journal des Scavans for 1672, by which channel it was soon known over Europe.

Excepting an unsuccessful attempt which the society made, by employing an artificer to imitate the Newtonian construction, but upon a larger scale, and a disguised Gregorian telescope, set up by Cassegrain abroad as a rival to Newton's, no reflector was heard of for nearly half a century after. But when that period was elapsed, a reflecting telescope of the Newtonian form was at last produced by Mr. Hadley, the inventor of the reflecting quadrant. The two telescopes which Newton had made were but six inches long; they were held in the hand for viewing objects, and in power were compared to a six feet refractor; whereas Hadley's was above five feet long, was provided with a well-contrived apparatus for managing it, and equalled in performance the famous aërial telescope of Huygens of 123 feet in length. Excepting the manner of making the specula, we have, in the Philosophical Transactions of 1723, a complete description, with a figure of this telescope, together with that of the machine for moving it; but, by a strange omission, Newton's name is not once mentioned in that paper, so that any person not acquainted with the history of the invention, and reading that account only, might be apt to conclude that Hadley had been the sole inventor.

The same celebrated artist, after finishing two telescopes of the Newtonian construction, accomplished a third of the Gregorian form; but, it would seem, less successful. Mr. Hadley spared no pains to instruct Mr. Molyneux and the Rev. Dr. Bradley; and, when those gentlemen had made a sufficient proficiency in the art, being desirous that these telescopes should become more public, they liberally communicated to some of the principal instrument-makers of London the knowledge they had acquired from him.

Mr. James Short, as early as the year 1734, had signalized himself at Edinburgh by the excellence of his telescopes. Mr. Maclaurin wrote that year to Dr. Jurin, "that Mr. Short, who had

begun with making glass specula, was then applying himself to improve the metallic; and that, by taking care of the figure, he was enabled to give them larger apertures than others had done; and that upon the whole they surpassed in perfection all that he had seen of other workmen." He added, "that Mr. Short's telescopes were all of the Gregorian construction; and that he had much improved that excellent invention." This character of excellence Mr. Short maintained to the last; and with the more facility, as he was well acquainted with the theory of optics. It was supposed that he had fallen upon a method of giving the parabolic figure to his great speculum; a point of perfection that Gregory and Newton had despaired of attaining; and that Hadley had never, as far as he knew, attempted. Mr. Short indeed affirmed, that he had acquired that faculty, but never would tell by what peculiar means he effected it; so that the secret of working that configuration, whatever it was, died with that ingenious artist. Mr. Mudge, however, has lately realised the expectation of sir Isaac Newton, who, above 100 years ago, presaged that the public would one day possess a parabolic speculum, not accomplished by mathematical rules, but by mechanical devices.

This was a desideratum, but it was not the only want supplied by this gentleman: he has taught us likewise a better composition of metals for the specula, how to grind them better, and how to give them a finer polish; and this last part (namely, the polish), he remarks, was the most difficult and essential of the whole operation. "In a word (says sir John Pringle), I am of opinion, there is no optician in this great city (which hath been so long and so justly renowned for ingenious and dexterous makers of every kind of mathematical instruments) so partial to his own abilities as not to acknowledge, that Mr. Mudge has opened to them all some new and important lights, and has greatly improved the art of making reflecting telescopes."

The late reverend and ingenious John Edwards devoted much of his time to the improvement of reflecting telescopes, and brought them to such perfection, that Dr. Maskelyne, the astronomer royal, found telescopes constructed by him to surpass in brightness, and other respects, those of the same size made by the best artists in London. The chief excellence of his telescopes arises from the composition, which, from various trials on metals and semimetals, he discovered for the specula, and from the true parabolic figure, which, by long practice, he had found a method of giving them, preferable to any that was known before him. His directions for the composition of specula, and for casting, grinding, and polishing them, were published, by order of the commissioners of longitude, at the end of the Nautical Almanac for the year 1787. To the same almanac is also annexed his account of the cause and cure of the tremors which particularly affect reflecting telescopes more than refracting ones, together with remarks on these tremors by Dr. Maskelyne.

But in constructing reflecting telescopes of extraordinary magnifying powers, Dr. Herschel has displayed skill and ingenuity surpassing all his predecessors in this department of mechanics. He has made them from 7, 10, 20, to even 40 feet in length; and with instruments of these dimensions he is now employed in making discoveries in astronomy. See TELESCOPE.

The greatest improvement in refracting telescopes hitherto made public is that of Mr. Dolland, of which an account has already been given in a preceding section, in which his discoveries in the science of optics were explained. But, besides the obligation we are under to him for correcting the aberration of the rays of light in the focus of object-glasses, he made another considerable improvement in telescopes, viz. by correcting, in a great measure, both this kind of aberration, and also that which arises from the spherical form of lenses, by an expedient of a very different nature, viz. increasing the number of eye-glasses.

If any person, says he, would have the visual angle of a telescope to contain 20 degrees, the extreme pencils of the field must be bent or refracted in an angle of 10 degrees; which, if it be performed by one eye-glass, will cause an aberration from the figure, in proportion to the cube of that angle; but if two glasses be so proportioned and situated, as that the refraction may be equally divided between them, they will each of them produce a refraction equal to half the required angle; and therefore, the aberration being proportional to the cube of half the angle taken twice over, will be but a fourth part of that which is in proportion to the cube of the whole angle; because twice the cube of one is but ¼ of the cube of 2; so the aberration from the figure, where two eye-glasses are rightly proportioned, is but a fourth of what it must unavoidably be, where the whole is performed by a single eye glass. By the same way of reasoning, when the refraction is divided between three glasses, the aberration will be found to be but the ninth part of what would be produced from a single glass; because three times the cube of one is but one-ninth of the cube of three. Whence is appears, that by increasing the number of eye-glasses, the indistinctness which is observed near the borders of the field of a telescope may be very much diminished.

The method of correcting the errors arising from the different refrangibility of light is of a different consideration from the former. For, whereas the errors from the figure can only be diminished in a certain proportion according to the number of glasses, in this they may be entirely corrected by the addition of only one glass. Also in the day-telescope, where no more than two eye-glasses are absolutely necessary for erecting the object, we find, that by the addition of a third, rightly situated, the colours, which would otherwise make the image confused, are entirely removed. This, however, is to be understood with some limitation: for though the different colours into which the extreme pencils must necessarily be divided by the edges of the eye-glasses, may in this manner be brought to the eye in a direction parallel to each other, so as to be made to converge to a point on the retina; yet, if the glasses exceed a certain length, the colours may be spread too wide to be capable of being admitted through the pupil or aperture of the eye; which is the reason, that in long telescopes, constructed in the common manner, with three eye-glasses, the field is always very much contracted.

These considerations first set Mr. Dollond on contriving how to enlarge the field, by increasing the number of eye-glasses without affecting the distinctness or brightness of the image; and though others had been about the same work be-

fore, yet, observing that some five-glass telescopes which were then made would admit of farther improvement, he endeavoured to construct one with the same number of glasses in a better manner; which so far answered his expectations, as to be allowed by the best judges to be a considerable improvement on the former.

Encouraged by this success, he resolved to try if he could not make some farther enlargement of the field, by the addition of another glass, and by placing and proportioning the glasses in such a manner as to correct the aberrations as much as possible, without injuring the distinctness; and at last he obtained as large a field as is convenient or necessary, and that even in the longest telescopes that can be made.

These telescopes with six glasses having been well received, and some of them being carried into foreign countries, it seemed a proper time to the author to settle the date of his invention; on which account he drew up a letter, which he addressed to Mr. Short, and which was read at the Royal Society, March 1, 1753.

To Mr. Short we are indebted for the excellent contrivance of an equatorial telescope, or, as he likewise called it, a portable observatory; for with it pretty accurate observations may be made with very little trouble, by those who have no building adapted to the purpose. The instrument consists of a piece of machinery, by which a telescope mounted upon it may be directed to any degree of right ascension or declination, so that the place of any of the heavenly bodies being known, they may be found without any trouble, even in the day-time. As it is made to turn parallel to the equator, any object is easily kept in view, or recovered, without moving the eye from its situation. By this instrument most of the stars of the first and second magnitude have been seen, even at mid-day, when the sun was shining bright; as also Mercury, Venus, and Jupiter. Saturn and Mars are not so easy to be seen, on account of the faintness of their light, except when the sun is but a few hours above the horizon. This particular effect depends upon the telescope excluding almost all the light, except what comes from the object itself and which might otherwise efface the impression made by its weaker light upon the eye. Any telescope of the same magnifying power would have the same effect, could we be sure of pointing it right. Mr. Ramsden invented a portable or equatorial telescope, which may perhaps supersede the use of Mr. Short's.

In order to see the fixed stars in the day-time, it is necessary to exclude the extraneous light as much as possible. For this reason the greater the magnifying power of any telescope is, the more easily a fixed star will be distinguished in the day-time; the light of the star remaining the same in all magnifying powers of the same telescope, but the ground upon which it is seen becoming darker by increasing the magnifying power; and the visibility of a star depends very much upon the difference between its own light and that of the ground upon which it is observed. A fixed star will be very nearly equally visible with telescopes of very different apertures, provided the magnifying power remain the same.

M. Æpinus proposes to bend the tubes of long telescopes at right angles, fixing a plane mirror in the angular point, in order to make them more commodious for viewing objects near the zenith; and he gives particular instructions how to make them in this form, especially when they are furnished with micrometers. We are also informed that a little plane speculum is sometimes placed betwixt the last eye-glass and the eye in the reflecting telescopes, at an angle of 45°, for the same purpose.

The invention of microscopes was not much later than that of telescopes; and, according to Borellus, we are indebted for them to the same author, at least to Zacharias Jansen, in conjunction with his son.

The Jansens, however, have not always enjoyed, undisturbed, that share of reputation to which they seem to be entitled, with respect either to the telescope or the microscope. The discovery of the latter, in particular, has generally been considered as more uncertain than that of the former. All that many writers say we can depend upon is, that microscopes were first used in Germany about the year 1621. Others say positively, that this instrument was the contrivance of Cornelius Drebell, a man of ingenuity, who also invented the thermometer.

According to Borellus, Zacharias Jansen and his son presented the first microscopes they had constructed to prince Maurice, and Albert archduke of Austria. William Borell, who gives this account in a letter to his brother Peter, says, that when he was ambassador in England, in 1619, Cornelius Drebell, with whom he was intimately acquainted, showed him a microscope, which he said was the same that the archduke had given him, and had been made by Jansen himself. This instrument was not so short as they are generally made at present. but was six feet long, consisting of a tube of gilt copper, an inch in diameter, supported by three brass pillars in the shape of dolphins, on a base of ebony, on which the small objects were placed.

This microscope was evidently a compound one, or rather something betwixt a telescope and a microscope; so that it is possible that single microscopes might have been known, and in use, some time before: but perhaps nobody thought of giving that name to single lenses; though, from the first use of lenses, they could not but have been used for the purpose of magnifying small objects. In this sense we have seen, that even the ancients were in possession of microscopes; and it appears from Jamblicus and Plutarch, quoted by Dr. Rogers, that they gave such instruments as they used for this purpose the name of dioptra. At what time lenses were made so small as we now generally use them for magnifying in single microscopes, we have not found. But as this must necessarily have been done gradually, the only proper object of inquiry is the invention of the double microscope; and this is clearly given, by the evidence of Borellus above mentioned, to Z. Jansen, or his son.

The invention of compound microscopes is claimed by the same Fontana who arrogated to himself the discovery of telescopes; and though he did not publish any account of this invention till the year 1646 (notwithstanding he pretended to have made the discovery in 1618), Montucla, from not attending perhaps to the testimony of Borellus, is willing to allow his claim, as he thought there was no other person who seemed to have any better title to it.

Eustachio Divini made microscopes with two common object-glasses, and two plano-convex eye-glasses joined together on their convex sides.

so as to meet in a point. The tube in which they were inclosed was very large, and the eye-glasses almost as broad as the palm of a man's hand. Mr. Oldenburg, secretary to the Royal Society, received an account of this instrument from Rome, and read it at one of their meetings, August 6, 1668.

It was about this time that Hartsoeker improved single microscopes, by using small globules of glass, made by melting them in the flame of a candle, instead of the lenses which had before been made use of for that purpose. By this means he first discovered the *animalcula in semine masculino*, which gave rise to a new system of generation. A microscope of this kind, consisting of a globule of $\frac{1}{10}$ of an inch in diameter, M. Huygens demonstrated to magnify 100 times; and since it is easy to make them of less than half a line in diameter, they may be made to magnify 300 times.

But no man distinguished himself so much by microscopical discoveries as the famous M. Leeuwenhoek, though he used only single lenses with short foci, preferring distinctness of vision to a large magnifying power.

M. Leeuwenhoek's microscopes were all single ones each of them consisting of a small double convex glass, set in a socket between two silver plates rivetted together, and pierced with a small hole; and the object was fixed on the point of a needle, which could be placed at any distance from the lens. If the objects were solid, he fastened them with glue; and if they were fluid, or required to be spread upon glass, he placed them on a small piece of Muscovy talc, or thin glass; which he afterwards glued to his needle. He had, however, a different apparatus for viewing the circulation of the blood, which he could attach to the same microscopes.

M. Leeuwenhoek bequeathed the greater part of his microscopes to the Royal Society. They were placed in a small Indian cabinet, in the drawers of which were 13 little boxes, each of which contained two microscopes, neatly fitted up in silver.

The glass of all these lenses is exceedingly clear, but none of them magnifies so much as those globules which are frequently used in other microscopes. Mr. Folkes, who examined them, thought that they showed objects with much greater distinctness, a circumstance which M. Leeuwenhoek principally valued. His discoveries, however, are to be ascribed not so much to the goodness of his glasses, as to his great experience in using them.

Mr Baker, who also examined these microscopes, and reported concerning them to the Royal Society, found that the greatest magnifier enlarged the diameter of an object about 160 times, but that all the rest fell much short of that power. He therefore concluded that M. Leeuwenhoek must have had other microscopes of a much greater magnifying power for many of his discoveries.

It appears from M. Leeuwenhoek's writings, that he was not unacquainted with the method of viewing opaque objects by means of a small concave reflecting mirror, which was afterwards improved by M. Lieberkuhn. For, after describing his apparatus for viewing eels in glass tubes, he adds, that he had an instrument to which he screwed a microscope set in brass, upon which microscope he fastened a little dish of brass, probably that his eye might be thereby assisted to see objects better; for he says he had filed the brass which was round his microscope as bright as he could, that the light, while he was viewing objects, might be reflected from it as much as possible. This microscope, with its dish, is constructed upon principles so similar to those which are the foundation of our single microscope by reflection (See MICROSCOPE,) that it may well be supposed to have given the hint to the ingenious inventor of it.

In 1702, Mr. Wilson made several ingenious improvements in the method of using single magnifiers, for the purpose of viewing transparent objects; and his microscope, which is also a necessary part of the solar microscope, is in very general use at this day.

In 1710, Mr. Adams gave to the Royal Society the following account of his method of making small globules for large magnifiers. He took a piece of fine window-glass, and cut it with a diamond into several slips, not exceeding $\frac{1}{4}$ of an inch in breadth; then, holding one of them between the fore-finger and thumb of each hand over a very fine flame, till the glass began to soften, he drew it out till it was as fine as a hair, and broke it, then putting each of the ends into the purest part of the flame, he had two globules, which he could increase or diminish at pleasure. If they were held a long time in the flame, they would have spots in them, so that he drew them out immediately after they became round. He broke off the stem as near to the globule as he could, and lodging the remainder between the plates, in which holes were drilled exactly round, the microscope, he says, performed to admiration. Through these magnifiers the same thread of very fine muslin appeared three or four times bigger than it did in the largest of Mr. Wilson's magnifiers.

The ingenious Mr. Grey hit upon an easy expedient to make very good temporary microscopes, at but little expence. They consist of nothing but small drops of water, taken up with a point of a pin, and put into a small hole made in a piece of metal. These globules of water do not, indeed, magnify so much as those which are made of glass of the same size, because the refractive power of water is not so great; but the same purpose will be answered nearly as well by making them somewhat smaller.

The same ingenious person, observing that small heterogeneous particles inclosed in the glass of which microscopes are made, were much magnified when those glasses were looked through, thought of making his microscopes of water that contained living animalcula, to see how they would look in this new situation; and he found his scheme to answer beyond his expectation, so that he could not even account for their being magnified so much as they were: for it was much more than they would have been magnified if they had been placed beyond the globule, in the proper place for viewing objects. But Montucla observes, that, when any object is inclosed within this small transparent globule, the hinder part of it acts like a concave mirror, provided they be situated between that surface and the focus, and that, by this means, they are magnified above $3\frac{1}{2}$ times more than they would have been in the usual way.

Temporary microscopes of a different kind have been constructed by Dr. Brewster. They were composed of turpentine varnish, which was formed into a plano-convex lens, by laying a drop

of it upon a piece of plain glass; the under surface of the glass was then smoaked, and the black pigment removed immediately below the fluid lens. These lenses lasted for a long time, and shewed objects distinctly, even when combined into a compound microscope. See his Appendix to Ferguson's Lectures, vol. ii.

After the successful construction of the reflecting telescope, it was natural to expect that attempts would also be made to render a similar service to microscopes. Accordingly we find two plans of this kind. The first was that of Dr. Robert Barker. His instrument differs in nothing from the reflecting telescope, excepting the distance of the two speculums, in order to adapt it to those pencils of rays which enter the microscope diverging; whereas they come to the telescope from very distant objects nearly parallel to each other.

This microscope is not so easy to manage as those of the common kind. For vision by reflection, as it is much more perfect, so it is far more difficult than that by refraction. Nor is this microscope so useful for any but very small or transparent objects. For the object, being between the speculum and image, would, if it were large and opaque, prevent a due reflection.

Dr. Smith invented a double reflecting microscope, of which a theoretical and practical account is given in his remarks at the end of the second volume of his System of Optics. As it is constructed on principles different from all others, and, in the opinion of some, superior to them all, the reader will not be displeased with the following practical description.

A section of this microscope is shewn in fig. 11, where ABC and *abc* are two specula, the former concave, and the latter convex, inclosed within the tube DEFO. The speculum ABC is perforated, like the speculum of a Gregorian telescope; and the object to be magnified is so placed between the centre and principal focus of that speculum, that the rays flowing from it to ABC are reflected towards an image *pq*. But before they are united in that image, they are received by the convex speculum *abc*, and thence reflected through the hole BC in the vertex of the concave to a second image $\pi\kappa$, to be viewed through an eye-glass *l*. The object may either be situated between the two specula, or, which is perhaps better, between the principal focus and vertex *c* of the convex speculum *abc*, a small hole being made in its vertex for the incident rays to pass through. When the microscope is used, let the object be included between two little round plates of Moscovy-glass, fixed in a hole of an oblong brass plate *mn*, intended to slide close to the back-side of the convex speculum; which must therefore be ground flat on that side, and so thin that the object may come precisely to its computed distance from the vertex of the speculum. The slider must be kept tight to the back of the metal by a gentle spring. The distance of the object being thus determined once for all, distinct vision to different eyes, and through different eye glasses, must be procured by a gentle motion of the little tubes that contain these glasses. These tubes must be made in the usual form of those that belong to sir Isaac Newton's reflecting telescope, (see TELESCOPE,) having a small hole in the middle of each plate, at the ends of the tube, situated exactly in each focus of the glass: the use of these holes and plates is to limit the visible area, and hinder any straggling rays from entering the eye. To the tube of the eye-glass is fastened the arm *g*, on which the adjusting screw turns. A similar arm *u* is attached to the fixed tube X, in which the neck of the screw turns; and by turning the button *y*, the eye-tube is moved farther from or nearer to the object, by which means different sorts of eyes obtain distinct vision.

The rays which flow from the object directly through the hole in the concave speculum and through the eye glass, by mixing with the reflected rays, would dilute the image on the retina, and therefore must be intercepted. This is done by a very simple contrivance. The little hole in the convex speculum is ground conical as in the figure; and a conical solid P, of which the base is larger than the orifice in the back of the convex speculum, supported on the slender pillar PQ, is so placed as to intercept all the direct rays from the eye-glass. All the tubes are strongly blacked on their insides, and so is the conical solid, to hinder all reflection of rays from these objects upon the convex speculum. The little base, too, of the solid, should be made concave, that whatever light it may still reflect, may be thrown back upon the object; and its back-side being conical and blacked all over, will either absorb or laterally disperse any straggling rays which the concave speculum may scatter upon it, and so prevent their coming to the eye-glass.

Notwithstanding the interposition of this conical solid, yet when the eye-glass is taken out, distant objects may be distinctly seen through the microscope, by rays reflected from the metals, and diverging upon the eye from an image behind the convex speculum. But this mixture of foreign rays with those of the object, which is common to all kinds of microscopes in viewing transparent objects, is usually prevented by placing before the object a thick double convex lens L, to collect the sky-light exactly upon the object. This lens should be just so broad as to subtend the opposite angle to that which the concave speculum subtends at the object. The annular frame of the lens must be very narrow, and connected to the microscope by two or three slender wires or blades, whose planes produced may pass through the object, and intercept from it as little sky-light as possible.

This is not the place for explaining the principles of this microscope, or demonstrating its superiority over most others; nor are such explanation and demonstration necessary. Its excellence, as well as the principles upon which it is constructed, will be perceived by the reader, when he has made himself master of the laws of refraction and reflection as laid down in the articles CATOPTRICS and DIOPTRICS.

In 1738, or 1739, M. Lieberkuhn made two capital improvements in microscopes, by the invention of the solar microscope, and the microscope for opaque objects. When he was in England in the winter of 1739, he showed an apparatus of his own making, for each of these purposes, to several gentlemen of the Royal Society, as well as to some opticians, particularly Mr. Cuff in Fleet-street, who took great pains to improve them.

The microscope for opaque objects remedies the inconvenience of having the dark side of an object next the eye. For by means of a concave speculum of silver, highly polished, in the centre of which a magnifying lens is placed, the object is so strongly illuminated that it may be examined

with all imaginable ease and pleasure. A convenient apparatus of this kind, with four different speculums and magnifiers of different powers, was brought to perfection by Mr. Cuff.

M. Lieberkuhn made considerable improvements in his solar microscope, particularly in adapting it to the view of opaque objects; but in what manner this end was effected, M. Æpinus, who was highly entertained with the performance, and who mentions the fact, was not able to recollect: and the death of the ingenious inventor prevented his publishing any account of it himself. M. Æpinus invited those persons who came into the possession of M. Lieberkuhn's apparatus to publish an account of this instrument; but it doth not appear that his method was ever published.

This improvement of M. Leiberkuhn's induced M. Æpinus himself to attend to the subject: and by this means he produced a very valuable improvement in this instrument. For by throwing the light upon the foreside of any object by means of a mirror, before it is transmitted through the object-lens, all kinds of objects are equally well represented by it.

M. Euler proposed a scheme to introduce vision by reflected light into the magic lantern and solar microscope, by which many inconveniencies to which those instruments are subject might be avoided. For this purpose, he says, that nothing is necessary but a large concave mirror, perforated as for a telescope; and that the light be so situated, that none of it may pass directly through the perforation, so as to fall on the images of the objects upon the screen. He proposes to have four different machines, for objects of different sizes; the first for those of six feet long, the second for those of one foot, the third for those of two inches, and the fourth for those of two lines; but it is needless to be particular in the description of these, as more perfect instruments are described under the article MICROSCOPE.

Several improvements were made in the apparatus to the solar microscope, as adapted to view opaque objects, by M. Zeiher, who made one construction for the larger kind of objects, and another for the small ones.

Mr. Martin having constructed a solar microscope of a larger size than common, for his own use, the illuminating lens being 4½ inches in diameter, and all the other parts of the instrument in proportion, found, that by the help of an additional part, which he does not describe, he could see even opaque objects very well. If he had made the lens any larger, he was aware that the heat produced at the focus would have been too great for the generality of objects to bear. The expence of this instrument, he says, does not much exceed the price of the common solar microscope.

The smallest globules, and consequently the greatest magnifiers, for microscopes, that have yet been executed, were made by T. Di Torre of Naples, who, in 1765, sent four of them to the Royal Society. The largest of them was only two Paris points in diameter, and it was said to magnify the diameter of an object 640 times. The second was the size of one Paris point, and the third was no more than half of a Paris point, or the 144th part of an inch in diameter, and was said to magnify the diameter of an object 2560 times. One of these globules was wanting when they came into the hands of Mr. Baker, to whose examination they were referred by the Royal Society. This gentleman, so famous for his skill in microscopes, and his extraordinary expertness in managing them, was not able to make any use of these. With that which magnifies the least, he was not able to see any object with satisfaction; and he concludes his account with expressing his hopes only, that, as his eyes had been much used to microscopes, they were not injured by the attention he had given to them, though he believed there were few persons who would not have been blinded by it.

The construction of a telescope with six eye-glasses led M. Euler to a similar construction of microscopes, by introducing into them six lenses, one of which admits of so small an aperture, as to serve, instead of a diaphragm, to exclude all foreign light, though, as he says, it neither lessens the field of view, nor the brightness of objects.

The improvement of all dioptric instruments is greatly impeded by inequalities in the substance of the glass of which they are made; but though many attempts have been made to make glass without that imperfection, none of them have been hitherto quite effectual. M. A. D. Merklein, having found some glass which had been melted when a building was on fire, and which proved to make excellent object-glasses for telescopes, concluded that its peculiar goodness arose from its not having been disturbed when it was in a fluid state; and therefore he proposed to take the metal out of the furnace in iron vessels, of the same form that was wanted for the glass; and after it had been perfectly fluid in those vessels, to let it stand to cool, without any disturbance. But this is not always found to answer.

Having given this copious history of the discoveries in optics, we refer to the articles ABERRATION, ACHROMATIC, CATOPTRICS, COLOURS, DIOPTRICS, MICROSCOPES, TELESCOPES, VISION, &c. Also to the valuable history of optics by Dr. Priestley, and the treatises by Newton, J. Gregory, Smith, Pouguer, Lacaille, Boscovich, Euler, Emerson, and Harris, and the popular system in Gregory's translation of Haüy's Natural Philosophy.

OPTIGRAPH, an instrument intended to supply the place of a camera obscura. An instrument of this kind was invented by Mr. Ramsden, and improved by Mr. Thomas Jones of Mount-street. It consists of a telescope, the principal part of which hangs vertically by means of gimbals or a universal joint attached to a horizontal arm that screws to the top of a vertical pillar, and is capable of being elevated or depressed at pleasure: the pillar is fixed at its lower extremity to the drawing-board by a clamp. The telescope, instead of being constituted of a single tube, is formed of two at right angles to each other; the rays from any object are received by a plane mirror placed above the telescope adjustible to a position nearly parallel to the object, and are thence reflected through the object-glass along the vertical part of the telescope, until they reach another plane mirror posited at an angle of 45°, which reflects them along the horizontal branch of the instrument to the eye-glass, and eye. Between the oblique speculum and the eye-glass, and exactly in the focus of the latter,

Poor wizard, thou art ignorant whose the children are, that Salamis shall see perish; whether Greeks or Persians. It is certain, they must be either one, or the other; but thou needest not have told so openly, that thou knewest not which. Thou concealest the time of the battle under those fine poetical expressions, either when Ceres is spread abroad, or gathered together; and wouldst thou cajole us with such pompous language? who knows not, that if there be a sea-fight, it must either be in seed-time or harvest? it is certain it cannot be in winter. Let things go how they will, thou wilt secure thyself by this Jupiter, whom Minerva is endeavouring to appease. If the Greeks lose the battle, Jupiter proved inexorable to the last; if they gain it, why then Minerva at length prevailed."

Oracles of the Sibyls. See Sibyl.

Oracle, in an accommodatory sense, is one celebrated for wisdom.

To O'racle. *v. n.* (from the noun.) To utter oracles: not in use (*Milton*).

ORA'CULAR. Ora'culous. *a.* (from *oracle.*) 1. Uttering oracles; resembling oracles (*Pope*). 2. Positive; authoritative (*Glanville*). 3. Obscure; ambiguous (*King*).

ORA'CULOUSLY. *ad.* (from *oraculous.*) In manner of an oracle (*Brown*).

ORA'CULOUSNESS. *s.* (from *oraculous.*) The state of being oracular.

ORÆA, certain solemn sacrifices of fruits offered in the four seasons of the year, to obtain mild and temperate weather. They were offered to the goddesses who presided over the seasons, who attended upon the sun, and who received divine worship at Athens.

O'RAISON. *s.* (*oraison*, French.) Prayer; verbal supplication (*Dryden*).

O'RAL. *a.* (*oral*, Fr.) Delivered by mouth; not written (*Addison*).

O'RALLY. *ad.* (from *oral.*) By mouth; without writing (*Hale*).

ORAN, a city and seaport of Algiers, in the province of Mascara, with an excellent harbour, almost opposite Carthagena, in Spain.—It was taken by the Spaniards in 1509, and retaken in 1708. In 1732, the Spaniards became masters of it again, and have kept it ever since. In 1790, it was destroyed by an earthquake, little beside the exterior walls being left standing; and 2000 persons perished. It has a parish church, three monasteries, a hospital, and a military school; and is surrounded by forts and batteries. Close to the city is a strong castle, Alcazava, in which the Spanish governor resides. A considerable number of Mahometans take refuge here; they dwell in a distinct part of the city, receive pay from the court of Spain, and render signal services against the Moors. The greatest part of the inhabitants, who are about 12,000, consist of such as have been banished from Spain; and the same may, in a great measure, be said of the soldiers who compose the garrison. Oran is seated partly on the side of a hill, and partly in a plain, 225 miles W.S.W. of Algiers. Lon. 0. 5 W. Lat. 35. 58 N.

ORANG-OUTANG. See Simia.

ORANGE, a city of France, in the department of Vaucluse, lately a bishop's see. It was an important place in the time of the Romans. A triumphal arch, 200 paces from the town, was formerly within its limits; and here are also the remains of a fine amphitheatre, some aqueducts, &c. The fortifications were demolished by Lewis XIV in 1682. Orange was the capital of a principality of the same name, 17 miles long and 12 broad, given by Charlemagne to William au Cornet, as a reward for his military services. It was possessed successively by the houses of Baux, Chalons, and Nassau; and on the death of William III. of England, in 1702, Frederic William of Prussia claimed this principality as his heir. Lewis XIV. had seized it during the war with king William; but he exchanged it in 1713, with the king of Prussia, for the town of Geldres. The city is seated in a fine plain, on the river Aigues, 12 miles N. of Avignon, and 57 S. of Valence. Lon. 4. 49 E. Lat. 44. 9 N.

Orange tree. See Citrus.

Orange (Mock). See Philadelphus.

Orange (Sea). See Corallines.

Orange (Shaddock). See Shaddock.

O'RANGERY. *s.* (*orangerie*, Fr.) Plantation of oranges (*Spectator*).

O'RANGEWIFE. *s.* (*orange* and *wife.*) A woman who sells oranges (*Shakspeare*).

ORATAVA, a town on the W. side of the island of Teneriff, and the chief place of trade. It is seated at the bottom of an amphitheatre of mountains, out of which rises the Pike of Teneriff. Its port is at three miles distance. Lon. 16. 24 W. Lat. 28. 23 N.

ORATION *s.* (*oratio*, Latin.) A speech made according to the laws of rhetoric; a harangue; a declamation (*Watts*).

O'RATOR. *s.* (*orator*, Lat.) 1. A public speaker; a man of eloquence (*Shakspeare*). 2. A petitioner. This sense is used in addresses to chancery.

Orator (Public), an office of very considerable dignity, and of some emolument in the English universities. The public orator is the principal, and in many cases the only ostensible, agent for the university in all those matters or forms which are merely external. He carries on or superintends all correspondences which are calculated to promote the dignity, or raise the utility, of the seminary which constitutes him. He has little to do, indeed, with the internal government of the body, for which a variety of officers in different departments are appointed; but in all public affairs he is, as it were, the mouth of the whole; putting their deliberations into proper form, and communicating or publishing them, according to the intention of the university. Thus, if the whole university, or a committee appointed by them, or by statute, or by the will of any particular benefactor, have, after a comparative trial, adjudged a prize to any person or persons, it is the business of the public orator to inform the successful parties of the issue of the trial. Again, if for singular learning or for any remarkable good will shown to the uni-

versity by any person or persons, the senate or convocation are pleased to declare their grateful sense of it, either by conferring degrees, or otherwise as they think fit, the public orator is to notify this intention to the person or persons concerned; and so in other cases.

Another part of the public orator's business, is to present young noblemen, or those who take honorary degrees, *tanquam nobiles,* to the vice-chancellor: this he does in a Latin speech, which, according to circumstances, is either short or long; and of which the subject is generally a defence of that particular statute which allows the sons of noblemen, and some few others, to proceed to degrees before what is called the statutable time. In doing this, encomiums, often stronger than just, are made upon the learning and virtue of the noble candidate; a view is taken of the dignity of his ancient house; the honour is mentioned which has accrued to the university from the accession of such a member; and the oration concludes with promising great credit from his future conduct, as well as benefit from the influence of his rank in the state. These circumstances are deemed sufficient grounds for exempting the sons of noblemen from that tedious course of study through which the duller sons of commoners must all pass before they be thought worthy of academical honours.

ORATO'RICAL. *a.* (from *orator.*) Rhetorical; befitting an orator (*Watts*).

ORATORIO. A species of musical drama consisting of airs, recitatives, duets, trios, chorusses, &c. originally an imitation of the serious opera, but the subject of which is generally taken from scriptural story, and can only be duly treated by music of the sublimest style. The Oratorio, which derives its name from the Italian verb *orare,* to pray, was originally an improvement upon those laudi spirituali, or sacred songs and dialogues, which were sung by the priests, &c. in the oratory, or place of prayer. San Filippo Neri, a Florentine, is supposed to have first introduced this species of musical drama about the year 1585, or at least those vocal dialogues from which it had its immediate birth.

Oratorios, however, properly so called, were not produced till towards the middle of the seventeenth century. The persons at first were sometimes ideal, sometimes parabolical, and sometimes, as at present, taken from sacred history: but this species of drama soon assumed a more regular form, and oratorios became great favourites in Italy, where they were constantly performed in Lent, and have since given birth to some of the noblest and most elaborate compositions of the really great masters of that and other countries. The first oratorios performed in England were those produced by Mr. Handel, with the excellence of which the English public are well acquainted. Since that great master, Mr. Smith, Mr. Stanley, Dr. Arne, Dr. W[illegible], and Dr. Arnold, have tried their powers in this higher walk of composition; but though some of their respective productions possessed a degree of merit highly honourable to British talent, yet so inadequately were they encouraged, that from about the year 1771, no new work of the kind appeared for near thirty years, *i. e.* till the spring of 1799, when the Prophecy, a sacred oratorio, composed by the author of Busby's dictionary, was performed, for the first time, at the Theatre-Royal, Haymarket. (*Busby.*)

ORATORY is the art of speaking well, upon any subject, in order to persuade: and to speak well, as Cicero explains it, is to speak justly, methodically, floridly, and copiously. In which sense the word imports the same with rhetoric; the difference between the two only consisting in this, that one is taken from the Greek language, and the other from the Latin. However, the case is not precisely the same with the words rhetorician and orator. For although the Grecians used the former, to express both those who taught the art, and such as practised it; yet the Romans afterwards, when they adopted that word into their language, confined it to the teachers of the art, and called the rest orators.

Lord Bacon defines rhetoric, or oratory, to be the art of applying and addressing the dictates of reason to the fancy, and of so recommending them as to affect the will and desires. The end of rhetoric, he observes, is to fill the imagination with ideas and images, which may assist nature, without oppressing it.

Vossius defines rhetoric, the faculty of discovering what every subject affords of use for persuasion. Hence, as every author must invent arguments to make his subjects prevail; dispose those arguments, thus found out, in their proper places; give them the embellishments of language proper to the subject; and, if this discourse be for public delivery, utter them with that decency and force which may strike the hearer; rhetoric, or oratory, becomes divided into four parts, viz. invention, disposition, elocution, and pronunciation. As to the history of oratory, the first invention of it is ascribed by the Egyptians, and [illegible]s of the poets, to Mercury. Quintilian observes, with respect to the origin of this art, that we derive the faculty of speech from nature; but the art from observation: and that men, perceiving that some things in discourse are said to advantage, and others not, accordingly marked those things, in order to avoid the one, and imitate the other: and that they also added some things from their own reason and judgment, which being confirmed by use, they began to teach others what they knew themselves. But it is not known when this method of observation first took place. It is reasonable to believe, that the Greeks had the principles of this art so early as the time of Pitheus, whose nephew Theseus lived not long before the taking of Troy. And at this time Cicero thought it was in much esteem among them. After this period, there is a great chasm in the history of oratory: for Quintilian says, that afterwards Empedocles, who flourished about five hundred years after Troy was taken, is the first upon record who attempted any thing concerning it. About this time there arose several masters of this art, the chief of whom Quintilian has enumerated; as Corax and Tisias, of Sicily; Gorgias, of Leontium, in the same island, the scholar of Empedocles; Thrasymachus, of Calcedon; Prodicus, of Cea; Protagoras, of Abdera; Hippias, of Elis; Alcidamus, of Elea; Antiphon, who first wrote orations; Polycrates and Theodore, of Byzantium. Nor should we omit

Plato, whose elegant dialogue, entitled Gorgias, is still extant. To these succeeded Isocrates, the most renowned of the scholars of Gorgias, extolled by Cicero as the greatest master and teacher of oratory; Aristotle, whose system of oratory is esteemed the best and most complete of any in the Greek language; Demosthenes, who was an auditor of Isocrates, Plato, and Isæus, and who has been esteemed by the best judges the prince of Grecian orators; Æschines, who taught rhetoric at Rhodes; Theodectes and Theophrastus, disciples of Aristotle; Demetrius Phaleneus, scholar of Theophrastus; Hermagoras; Apollonius Molon; Areus. Cæcilius; Dionysius, of Halicarnassus; Apollonius, of Pergamus; and Theodore, of Gaza. After the time of Quintilian we may mention Hermogenes, and Longinus, the author of the excellent treatise Of the Sublime.

It was long before Rome received this art, and not without difficulty at first. The reason was, because the Romans were for several ages wholly addicted to military affairs, and to enlarge their territories; so that they not only neglected to cultivate learning, but thought the pursuit of it a thing of ill tendency, by diverting the minds of their youth from the cares and toils of war, to a more soft and indolent kind of life. Therefore so late as the year of their city 592, when by the industry of some Grecians the liberal arts began to flourish in Italy, a decree passed the senate, by which all philosophers and rhetoricians were ordered to depart out of Rome. But in a few years after, when Carneades, Critolans, and Diogenes, who were not only philosophers but orators, came ambassadors from Athens to Rome, the Roman youth were so charmed with the eloquence of their harangues, that they could no longer be stopt from pursuing the study of oratory. And by a farther acquaintance with the Greeks, it soon gained such esteem, that persons of the first quality employed their time and pains to acquire it. And a young gentleman who was ambitious to advance himself in the service of his country could have little hopes of success, unless he had laid the foundation of his future prospects in that study.

Seneca tells us, that Lucius Plotius, a Gaul, was the first who taught the art of oratory at Rome in Latin; which Cicero says, was while he was a boy; and when the most studious persons went to hear him, he lamented that he could not go with them; being prevented by the regard he paid to the opinion of some of his friends, who thought that greater improvements were made by exercises in the Greek language under Grecian masters. Seneca adds, that this profession continued for some time in the hands of freedmen; and that the first Roman who engaged in it was Blandus of the equestrian order, who was succeeded by others; some of whose lives are yet extant, written by Suetonius, as many of the Grecians' are by Philostratus and Eunapius. Quintilian likewise gives us the names of those among the Romans, who wrote upon the art. "The first (says he), as far as I can learn, who composed any thing upon this argument, was M. Cato the censor. After him Antony the orator began upon the subject, which is the only work he has left, and that imperfect. Then followed some of less note. But he who carried eloquence to its highest pitch among us, was Cicero; who has likewise by his rules given the best plan both to practise and teach the art. After whom modesty would require us to mention no more, had he not told us himself, that his books of rhetoric slipt out of his hands, while he was but a youth. And those lesser things which many persons want, he has purposely omitted in his discourses of oratory. Cornificius wrote largely upon the same subject; Stertinius and Gallio the father, each of them something. But Celsus and Lenas were more accurate than Gallio; and in our times Virginius, Pliny, and Rutilius. And there are at this day some celebrated authors of the same kind, who, if they had taken in every thing, might have saved my pains." Time has since deprived us of most of the writers mentioned here by Quintilian. But we have the less reason to regret this loss, since it has preserved to us Cicero's treatises upon this subject; which we may well suppose to have been chiefly owing to their own excellency, and the great esteem they have always had in the world. Besides his Two Books of Invention, which Quintilian here calls his Books of Rhetoric, there are extant of his, Three Books of an Orator; one Of famous Orators; and another, which is called The Orator; as also his Topics, a preface Concerning the best sort of Orators, and a treatise Of the parts of Oratory. Each of which treatises, whether we regard the justness and delicacy of the thoughts, the usefulness of the rules, or the elegance and beauty of the style, deserves to be frequently perused by all who are lovers of eloquence. For who can be thought so well qualified to give the rules of any art, as he who excelled all mankind in the practice of them? But those Four books to Herennius, which are published among Cicero's works, seem with good reason to be attributed to Cornificius, whom Quintilian here mentions. And Celsus is by some affirmed to have taught oratory, whom he also places among the rhetoricians, and whose Eight books of Medicine are yet extant, written in so beautiful a style, as plainly shows him to be a master of eloquence. But Quintilian himself outdid all who went before him in diligence and accuracy as a writer. His Institutions are so comprehensive, and written with such great exactness and judgment, that they are generally allowed to be the most perfect work of the kind. With this excellent author we shall finish the account of the Latin rhetoricians.

With regard to rules of oratory, we cannot here find room for more than some of the most judicious rules which have been given with respect to pronunciation or action.

Chap. I. *Of Pronunciation in general, and of the Management of the Voice.*

Pronunciation is also called action by some of the ancients. Though, if we attend to the proper signification of each of these words, the former respects the voice, and the latter the gestures and motions of the body. But if we consider them as synonymous terms, in this large sense pronunciation or action may be said to be a suitable conformity of the voice, and the several motions of the body, in speaking, to the subject matter of the discourse.

The best judges among the ancients have represented this as the principal part of an orator's province, from whence he is chiefly to expect success in the art of persuasion. When Cicero, in the person of Crassus, has largely and elegantly discoursed upon all the other parts of oratory, coming at last to speak of this, he says: "All the former have their effect as they are pronounced. It is the action alone that governs in speaking; without which the best orator is of no value, and is often defeated by one in other respects much

his inferior." And he lets us know, that Demosthenes was of the same opinion, who, when he was asked what was the principal thing in oratory, replied, action; and being asked again a second and a third time, what was next considerable, he still made the same answer. By which he seemed to intimate, that he thought the whole art did in a manner consist in it. And indeed, if he had not judged this highly necessary for an orator, he would scarce have taken so much pains in correcting those natural defects, under which he laboured at first, in order to acquire it. For he had both a weak voice, and likewise an impediment in his speech, so that he could not pronounce distinctly some particular letters. The former of which defects he conquered, partly by speaking as loud as he could upon the shore, when the sea roared and was boisterous; and partly, by pronouncing long periods as he walked up hill; both of which methods contributed to the strengthening of his voice. And he found means to render his pronunciation more clear and articulate, by the help of some little stones put under his tongue. Nor was he less careful in endeavouring to gain the habit of a becoming and decent gesture; for which purpose he used to pronounce his discourses alone before a large glass.

Voice is one kind of sounds. Now the influence of sounds, either to raise or allay our passions, is evident from music. And certainly the harmony of a fine discourse, well and gracefully pronounced, is as capable of moving us, if not in a way so violent and ecstatic, yet not less powerful, and more agreeably to our rational faculties. As the business of this chapter is to offer some considerations for the just and decent management of the voice, it may not be improper in the first place to observe in general what nature does when free and unconstrained. As persons are differently affected when they speak; so they naturally alter the tone of their voice, though they do not attend to it. It rises, sinks, and has various inflections given it, according to the present state and disposition of the mind. When the mind is calm and sedate, the voice is moderate and even; when the former is dejected with sorrow, the latter is languid; and when that is inflamed by passion, this is raised and elevated. It is the orator's business, therefore, to follow nature, and to endeavour that the tone of his voice appear natural and unaffected. And for this end, he must take care to suit it to the nature of the subject; but still so as to be always grave and decent. Some persons continue a discourse in such a low and drawling manner, that they can scarce be heard by their audience. Others again hurry on in so loud and boisterous a manner as if they imagined their hearers were deaf. But all the music and harmony of speech lies in the proper temperament of the voice between these extremes. In order to set this matter in a just light, it will be necessary to consider the principal affections or properties of the voice, and how they are to be regulated by an orator. Now these may all be referred either to quantity or quality.

The quantity of the voice consists in its highness or lowness, swiftness or slowness, and the intermediate degrees between them.

Every person who speaks in public should endeavour, if he can, to fill the place where he speaks. But still he ought to be careful not to exceed the natural key of his voice. If he does, it will neither be soft nor agreeable; but either harsh and rough, or too shrill and squeaking. Besides, he will not be able to give every syllable its full and distinct sound; which will render what he says obscure, and difficult to be understood. He should therefore take care to keep his voice within reach, so as to have it under management, that he may raise or sink it, or give it any inflection he thinks proper: which it will not be in his power to do, if he put a force upon it, and strain it beyond its natural tone.

The like caution is to be used against the contrary extreme, that the voice be not dropped, and suffered to sink too low. This will give the speaker pain in raising it again to its proper pitch, and be no less offensive to the hearers. For though the music of speech consists in the variations of the voice, yet they must be gradual to render them pleasant. Such sudden and great changes at once are rather to be esteemed chasms in speaking, than variations. Besides, as they often prevent the hearers from taking in the sense of what is said, it gives them no small uneasiness that they are obliged to stretch their attention. Many persons are too apt to be guilty of this, especially at the end of a sentence, by dropping the last word: which ought in a particular manner to be expressed distinctly, because the meaning of the whole sentence often depends upon it.

The medium between these two is a moderate and even voice. But this is not the same in all; that which is moderate in one would be high in another. Every person therefore must regulate it by the natural key of his own voice. A calm and sedate voice is generally best; as a moderate sound is most pleasing to the ear, if it be clear and distinct. But this equality of the voice must also be accompanied with a variety, otherwise there be no harmony; since all harmony consists in variety. Nothing is less pleasing than a discourse pronounced throughout in one continued tone of the voice, without any change or alteration. Besides, a variation of the voice is an ease to the speaker; as the body is relieved by shifting its posture. The equality, therefore, we are here speaking of admits a variety of inflections and changes within the same pitch. And when that is altered, the gradations, whether higher or lower, should be so gentle and regular as to preserve a due proportion of the parts and harmony of the whole; which cannot be done, when the voice is suddenly varied with too great a distinction. And therefore it should move from one key to another, so as rather to glide like a gentle stream, than pour down like a rapid torrent, as an ingenious writer has well expressed it. An even voice is best fitted to keep the mind to close attention. And therefore, in subjects designed only for instruction, without any address to the passions, there is little room for a variety of voice. For the voice ought to agree with the style; and as upon such subjects this should be equal, moderate, and smooth, so should the other. Every thing, as we say, is beautiful in its season; and there is a certain propriety in things which ought always to be regarded. And therefore, an affected variety, ill placed, is as disagreeable to a judicious audience, as the want of it, where the subject requires it. We may find some persons, in pronouncing a grave and plain discourse, affect as many different tones, changes, and variations of their voice, as if they were acting a comedy; which is doubtless a very great impropriety. But the orator's province is not barely to apply to the mind, but likewise to the passions; which require a great variety of the voice, high or low, vehement or languid, according to the nature of the passions he designs to affect. So that for an orator always to use the

same tone or degree of his voice, and expect to answer all his views by it, would be much the same thing as if a physician should propose to cure all distempers by one medicine. From hence it is evident, that although various inflections and tones of the voice are requisite to make it harmonious and pleasing to the ear; yet the degree of it should differ according to the nature of the subject and design of the speaker. And, as a perfect monotony is always unpleasant, so it can never be necessary in any discourse.

The next property of the voice above-mentioned was swiftness. That some expressions ought to be pronounced faster and swifter than others, is very manifest. Gay and sprightly ideas should not only be expressed louder, but also faster, than such as are sad and melancholy. And when we press an adversary, the voice should be brisk and quick. But to hurry on in a precipitant manner without pausing, till stopt for want of breath, is certainly a very great fault. This destroys not only the necessary distinction between sentence and sentence, but likewise between the several words of the same sentence; nay, and often occasions us to express our words by halves, while one is thrown so fast upon another, that we are not able to give each its full and just sound. By this means all the grace of speaking is lost, and in a great measure the advantage of hearing. For when the ears of the hearers cannot keep pace with the volubility of the speaker's tongue, they will be little the better for what he says. Besides, by not commanding his voice, and easing his breath at the proper pauses and points of distinction, he is often obliged to stop in the middle of a sentence; and so divides what should be continued, and joins what should be separated; which must necessarily destroy the sense, and confound his discourse. Young persons are very liable to this, especially at first setting out. And it often arises from diffidence. They are jealous of their performances, and the success they may have in speaking, which gives them a pain till it is over; and this puts them into a hurry of mind, which incapacitates them from governing their voice, and keeping it under that due regulation which perhaps they proposed to themselves before they began to speak. And the greater degree such persons have of a native and ingenuous modesty, accompanied with a laudable ambition to excel, they are commonly more exposed to this. For while on the one hand they are fired with an ardent desire to recommend themselves, and on the other are fearful of the event, this dubious state of mind is very apt to throw them off their guard, and run them into this excess. From which we may see the great advantage of having the voice well formed betimes; for when once it is become habitual to speak with justness and propriety, persons readily practise it without much attention or concern.

And as a precipitant and hasty pronunciation is culpable, so likewise on the other hand, it is a fault to speak too slow. This seems to argue a heaviness in the speaker. And as he appears cool himself, he can never expect to warm his hearers, and excite their affections. When not only every word, but every syllable is drawn out to too great a length, the ideas do not come fast enough to keep up the attention without much uneasiness. For, till the sense is completed, the mind is in suspense; and, if it be held long in that situation, it will of course flag and grow tired. Indeed, in some cases, it is requisite the pronunciation should be slower than in others; as in representing things great and difficult; or in expressing some particular passions, as admiration or grief. But the extreme we are now speaking of, is a slowness equally continued through a whole discourse, which must necessarily render it flat and lifeless.

Now, to avoid either of the two extremes last-mentioned, the voice ought to be sedate and distinct. And in order to render it distinct, it is necessary, not only that each word and syllable should have its just and full sound, both as to time and accent; but likewise that every sentence, and part of a sentence, should be separated by its proper pause and interval. This is more easy to be done in reading, from the assistance of the points; but it is no less to be attended to in speaking, if we would pronounce in a distinct and graceful manner. For every one should speak in the same manner as he ought to read, if he could arrive at that exactness. Now the common rule given in pausing is, that we stop our voice at a comma till we can tell one, at a semicolon two, at a colon three, and at a full period four. And as these points are either accommodated to the several parts of the same sentence, as the first three; or different sentences, as the last; this occasions the different length of the pause, by which either the dependence of what precedes upon that which follows, or its distinction from it, is represented. And therefore, in the first three stops, the voice is rather to be suspended in different degrees or measures of time, than entirely dropt, to show that the sense is not yet completed. But between sentence and sentence we respire, and begin anew. So that in long periods, the voice should be favoured by beginning low and sedately, that it may hold to the end without respiration; or if it will not, the breath ought to be recovered without sinking the voice. For if once the voice drop for want of breath before the period be finished, not only the beauty, but likewise the sense of it will be lost. Quintilian lays a great stress upon a due attention to these pauses; and says, "Though it may appear not so considerable in itself, yet all the other virtues of a good pronunciation are deficient without it."

Hitherto we have considered such properties of the voice as respect quantity, we come now to speak of its qualities. And the chief of these are strength or weakness, clearness or obscureness, fulness or smallness, smoothness or roughness. Now, one half of these is what every one would willingly choose, as he would wish to be free from the others. But it is not in our power to give ourselves what qualities of the voice we please; but only to make the best use we can of what nature has bestowed upon us. However, several defects of the voice are capable of being helped by care and proper means; as, on the other hand, the best voice may be greatly hurt by ill management and indiscretion. Temperance is a great preservative of the voice, and all excess is highly prejudicial to it. The voice must necessarily suffer, if the organs of speech have not their proper tone. And in order to their having this, they must be kept in a due temperature; that is, they must neither be too moist nor too dry. If they abound with fluids, these will obstruct the clearness of the voice, and render it obscure and confused; and if they are parched with drought, the voice will be harsh and rough. Now all excesses, as well as some bodily indispositions, are apt to affect the organs one or other of these ways.

A strong voice is very serviceable to an orator, because, if it want some other advantages, he is, however, capable to make himself heard. And if at any time he is forced to strain it, he is in less danger of its failing him before he has finished his

[illegible]. But he who has a weak voice, should be very careful not to strain it, especially at first. He ought to begin low, and rise gradually to such a pitch as the key of his voice will well carry him, without being obliged to sink again afterwards. Frequent inflections of the voice will likewise be some assistance to him. But especially he should take care to speak deliberately, and ease his voice, by allowing due time for respiration at all the proper pauses. It is an extreme much less inconvenient for such a person rather to speak too slow, than too fast. But this defect of a weak voice is sometimes capable of being helped by the use of proper methods; as is evident from the instance of Demosthenes, before mentioned.

A voice is said to be clear, when the organs of speech are suited to give every single letter, and all the combinations of them in syllables and words their proper and distinct sound. Such a voice is very pleasing and agreeable to the hearers; and no less a happiness to the speaker, as it saves him a great expence of spirits. For a moderate voice, if clear, will be as distinctly heard, as one much louder, if thick and obscure. Which is a great advantage to the speaker, because he can better keep his voice under command, and modulate it at pleasure, as the several parts and circumstances of his discourse may require. On the contrary, an obscure and confused voice is not always occasioned from a deficiency in the organ; but many times is the effect of custom and a bad habit. Some persons, either from want of due care in their education at first, or from inadvertency and negligence afterwards, run into a very irregular and confused manner of expressing their words; either by misplacing the accent, confounding the sound of the letters, or huddling the syllables one upon another, so as to render what they say often unintelligible. Indeed, sometimes this arises from a natural defect, as in the case of Demosthenes; who found a method to rectify that, as well as the weakness of his voice. But in faults of this kind, which proceed from habit, doubtless the most likely way to mend them is to speak deliberately.

A full voice is not the same as a strong or a loud voice. It fills the ear, but it is often not pleasant. And therefore to render it so, as well as audible, it should be frequently varied. However, this seems better suited to the character of an orator, than a small and shrill voice; because it has something in it more grave and manly. And those who have the misfortune of a very small voice, should be cautious of raising it to too high a pitch, especially at once; because the sudden compressure of the organ is apt to occasion a squeaking and very disagreeable sound.

A soft and smooth voice is of all the most musical, especially if it be flexible. And on the contrary, nothing is less harmonious than a voice that is harsh and rough. For the one grates as disagreeably upon the ear, as the other gives it pleasure and delight.

From the consideration of these several properties of the voice, we may conclude that to be the best and fittest for an orator, which is moderate, distinct, firm, clear, and smooth, and withal easily flexible to the several degrees and variations of sound which every part of the discourse may require.

Chap. II. *Of Gesture.*

By this is meant, a suitable conformity of the motions of the countenance, and several parts of the body in speaking, to the subject matter of the discourse. The word gesture is here used in a larger sense than is ordinarily done in common language. For we rarely make use of that word to denote the motions of the countenance, or any parts of it; but as these make a considerable part of our present subject, they must here be comprehended under this term.

It is not agreed among the learned, whether voice or gesture has the greater influence upon us. But as the latter affects us by the eye, as the former does by the ear, gesture in the nature of it seems to have this advantage, that it conveys the impression more speedily to the mind; for the sight is the quickest of all our senses. Nor is its influence less upon our passions; nay, in some instances it appears to act more powerfully. A cast of the eye shall express desire in as moving a manner as the softest language; and a different motion of it, resentment. To wring the hands, tear the hair, or strike the breast, are all strong indications of sorrow. And he who claps his hand to his sword, throws us into a greater panic than one who only threatens to kill us. Nor is it in some respects less various and extensive than language. Cicero tells us, he often diverted himself by trying this with Roscius the comedian; who could express a sentence as many ways by his gestures, as he himself by words. And some dramas, called pantomimes, have been carried on wholly by mutes, who have performed every part by gestures only, without words, in a way very intelligent, as well as entertaining to the spectators. Well therefore might Cicero call action (or gesture) the language of the body, since it is capable in so lively a manner to convey both our ideas and passions. But with respect to oratory, gesture may very properly be called the second part of pronunciation; in which, as the voice should be suited to the impressions it receives from the mind, so the several motions of the body ought to be accommodated to the various tones and inflections of the voice. When the voice is even and moderate, little gesture is required; and nothing is more unnatural than violent motion, in discoursing upon ordinary and familiar subjects. The motions of the body should rise therefore in proportion to the vehemence and energy of the expression, as the natural and genuine effect of it.

But as gesture is very different and various as to the manner of it, which depends upon the decent conduct of several parts of the body; it will not be amiss to consider more particularly the proper management of each of those parts. Now all gesture is either natural, or from imitation. By natural gesture we mean such actions and motions of the body, as naturally accompany our words, as these do the impressions of our minds. And these either respect the whole body, or some particular part of it. But before we enter upon this, give us leave just to observe, that it has been customary in all ages and countries, in making a set discourse before an assembly, to do it standing. Thus we read, that "Abraham stood up, and spake unto the children of Heth." And it seems as if he sat down, when he had ended his speech; because, immediately after the account of their answer, it is said again, that "Abraham stood up and bowed himself to the people of the land, the children of Heth." In like manner Homer represents the Grecian princes, as standing up, when they made a speech, either to the army, or in their councils. So when Achilles has assembled the army, to inquire into the reason of the great plague which at that time raged among them, he rises up before he begins to

speak, and sits down again when he has done. After him the prophet Calchas rises, and charges it upon Agamemnon; who rising up in a passion, does not refuse to comply with what Calchas proposed, but expresses his resentment at him for saying it. And upon another occasion, both Agamemnon and Nestor do the same in council. And Cicero acquaints us, that when Lentulus had been charged in the senate as an associate with Catiline, he stood up to make his defence. Nor does the advantage of being better heard, seem to have been the only reason for so general an agreement in this posture; but it appears likewise to have been chosen, as the most decent and respectful. Sitting carries in it an air of authority, and is therefore a posture scarce used upon such occasions, unless perhaps where that is designed to be expressed by it. Wherefore it was a thing very much resented, that when Cæsar, after he had got the power into his hands, once addressed the senate, he either refused to rise, as some say, or as others, one of his friends held him down by his gown.

But though standing appears to be the most proper posture for speaking in public, yet it is very unbecoming for the body to be entirely without any motion, like a statue. It should not long continue in the same position, but be constantly changing, though the motion be very moderate. There ought to be no appearance of stiffness, but a certain ease and pliableness, naturally suiting itself to every expression; by which means, when a greater degree of motion is necessary, it will appear less sudden and vehement: for as the raising, sinking, and various inflections of the voice must be gradual; so likewise should the motions of the body. It is only on some particular occasions that an hasty vehemence and impetuosity is proper in either case.

As to the several parts of the body, the head is the most considerable. To lift it up too high has the air of arrogance and pride; to stretch it out too far, or throw it back, looks clownish and unmannerly; to hang it downwards on the breast, shows an unmanly bashfulness and want of spirit; and to suffer it to lean on either shoulder, argues both sloth and indolence. Wherefore in calm and sedate discourse it ought to keep its natural state, an upright posture. However, it should not be long without motion, nor yet always moving; but gently turn sometimes on one side, and sometimes on the other, as occasion requires, that the voice may be heard by all who are present; and then return again to its natural position. It should always accompany the other actions of the body, and turn on the same side with them; except when aversion to any thing is expressed, which is done by stretching out the right hand, and turning the head to the left. The ancients erected a statue of Venus in this posture, who was called by the Greeks ἀποστροφία, and by the Latins Verticordia, and in English may be termed the forbidding Venus. But nothing is more indecent than violent motions and agitations of the head. And therefore, when a witty writer, who is well known among us, would convey the most ridiculous idea of a pretender to knowledge, he expresses it thus:

> For having three times shook his head
> To stir his wit up, thus he said. *Hudib.*

But it is the countenance, that chiefly represents both the passions and dispositions of the mind. By this we express love, hatred, joy, sorrow, modesty, and confidence: by this we supplicate, threaten, sooth, invite, forbid, consent, or refuse; and all this without speaking. Nay, from hence we form a judgment not only of a person's present temper, but of his capacity and natural disposition. And therefore it is common to say, such an one has a promising countenance, or that he promises little by his countenance. It is true, this is no certain rule of judging; nor is it in the power of any one to alter the natural make of his countenance; however, it may put us upon endeavouring to gain the most pleasing aspect we can; since it is so natural for mankind to draw such conclusions from it; and some persons are so unhappy, as to render their countenance more disagreeable, than otherwise it would be, by ill habits.

But the several parts of the face bear their part, and contribute to the proper and decent motion of the whole. In a calm and sedate discourse, all the features retain their natural state and situation. In sorrow, the forehead and eyebrows lour, and the cheeks hang down. But in expressions of joy and cheerfulness, the forehead and eyebrows are expanded, the cheeks contracted, and the corners of the mouth drawn upwards. Anger and resentment contract the forehead, draw the brows together, and thrust out the lips. And terror elevates both the brows and forehead. As these are the natural signs of such passions, the orator should endeavour to conform to them.

But as the eyes are most active and significant, it is the advice of Cicero that the greatest care should be taken in their management. And he gives this reason for it, "because other parts of the countenance have but few motions; whereas all the passions of the soul are expressed in the eyes, by so many different actions, which cannot possibly be represented by any gestures of the body, if the eyes are kept in a fixed posture." Common experience does in a great measure confirm the truth of this observation. We readily guess at a person's intention, or how he is affected to us, by his eyes. And any sudden change or emotion of the mind is presently followed by an alteration in the look. In speaking therefore upon pleasant and delightful subjects, the eyes are brisk and cheerful; as, on the contrary, they sink and are languid in delivering any thing melancholy and sorrowful. This is so agreeable to nature, that before a person speaks, we are prepared with the expectation of one or the other from his different aspect. So likewise in anger, a certain vehemence and intenseness appears in the eyes, which, for want of proper words to express it by, we endeavour to represent by metaphors taken from fire, the most violent and rapid element, and say in such cases, the eyes sparkle, burn, or are inflamed. In expressions of hatred or detestation, it is natural to alter the look, either by turning the eyes aside, or downwards. Virgil has very justly observed this: for when he describes Æneas meeting with Dido in the Elysian shades, and addressing her, he represents her disregard of him, by saying,

> Disdainfully she look'd; then turning round,
> Still fix'd her eyes unmov'd upon the ground.

She showed her resentment for his former treatment of her, by not vouchsafing to look on him. Indeed, the eyes are sometimes turned downwards upon other occasions, as to express modesty. And if at any time a particular object be addressed to, whatever it be, the eyes should be turned that way. And therefore Philostratus very deservedly ridicules a certain rhetorician as guilty of a solecism in gesture, who, upon saying, "O

Jupiter!" turned his eyes downward; and when he said, "O earth!" looked upward. A staring look has the appearance of giddiness and want of thought; and to contract the eyes, gives suspicion of craft and design. A fixed look may be occasioned from intenseness of thought, but at the same time shows a disregard to the audience; and a too quick and wandering motion of the eyes denotes levity and wantonness. A gentle and moderate motion of the eyes is therefore in common most suitable, always directed to some of the audience, and gradually turning from side to side with an air of respect and modesty, and looking them decently in the face, as in common discourse: such a behaviour will of course draw an attention. As in conversation, when a person addresses us in an handsome and becoming manner, we presently put ourselves in a posture to give what he says a proper reception. But as all the passions are in the most lively manner expressed in the eyes, their motions ought to vary according to the different nature of those passions they are suited both to discover in the speaker, and convey to his hearers; since, as the quickest access to the mind is by the sight, a proper well-timed look will sometimes sooner effect this than it can be done by words; as in discharging a cannon, we are struck with the light before we hear the sound.

As to the other parts of the body distinct from the head, the shoulders ought not to be elevated; for this is not only in itself indecent, but it likewise contracts the neck, and hinders the proper motion of the head.. Nor on the other hand, should they be drawn down, and depressed; because this occasions a stiffness both to the neck and the whole body. Their natural posture therefore is best, as being most easy and graceful. To shrug the shoulders has an abject and servile air; and frequently to heave them upwards and downwards is a very disagreeable sight.

A continued motion of the arms any way is by all means to be avoided. Their action should generally be very moderate, and follow that of the hand, unless in very pathetic expressions, where it may be proper to give them a more lively spring.

The hands need never be idle. Quintilian seems to think them as necessary and powerful in action, as Cicero does the eyes. "The hands (says he), without which all gesture is lame and weak, have a greater variety of motions than can well be expressed; for they are almost equal to our words. Do not we desire with them, promise, call, dismiss, threaten, beseech, detest, fear, inquire, deny? Do not they express joy, sorrow, doubt, confession, penitence, measure, plenty, number, and time? Do not they excite, restrain, prove, admire, and shame? That in so great a variety of speech among all nations and countries, this seems to me the common language of all mankind." Thus far Quintilian. Now, all bodily motion is either upward or downward, to the right or left, forward or backward, or else circular. The hands are employed by the orator in all these, except the last. And as they ought to correspond with our expressions, so they ought to begin and end with them. In admiration, and addresses to heaven, they must be elevated, but never raised above the eyes; and in speaking of things below us, they are directed downwards. Side motion should generally begin from the left, and terminate gently on the right. In demonstrating, addressing, and on several other occasions, they are moved forward; and in threatening sometimes thrown back. But when the orator speaks of himself, his right-hand should be gently laid on his breast. When no other motion is necessary, the hands should be kept about as high as the breast, so as to make near a right angle with the arm. This is not only graceful, but likewise the most easy posture, and gives the least strain to the muscles. They should never be suffered to hang down, nor to loll upon the cushion or bar. The left hand should never move alone, but accommodate itself to the motions of the right. In motions to the left side, the right hand should not be carried beyond the left shoulder. In promises, and expressions of compliment, the motion of the hands should be gentle and slow; but in exhortations and applause more swift. The hands should generally be open: but in expressions of compunction and anger they may be closed. All finical and trifling actions of the fingers ought to be avoided; nor should they be stretched out and expanded in a stiff and rigid posture, but kept easy and pliable.

Neither the breast nor the belly should be thrust out; which in itself looks ungainly, and hinders the free motion of the trunk; which ought not to be kept too stiff and upright, but easy and flexible, always suiting itself to the motions of the head and hands. The feet should continue steady, and not give the body a wavering and giddy motion, by frequently shifting; though some persons fall into that habit, without moving their feet. Curio, a Roman orator, as Cicero tells us, was addicted to this; which occasioned a friend of his once to pass a joke upon him, by asking, "Who that was talking out of a boat?" The jest is too plain to need explication; for every one knows the waving of a boat will give the body such a motion.

The gestures we have hitherto discoursed of, are such as naturally accompany our expressions. And we believe those we have mentioned, if duly attended to, will be found sufficient to answer all the purposes of our modern pronunciation. The ancients, indeed, used several more vehement actions and gestures than we are accustomed to; as we have formerly shown. Philip the Roman orator, as Cicero informs us, did not use to prepare his discourses; but spoke, as we say, off hand. And he was wont to tell his friends, "he was never fit to talk till he had warmed his arm." He doubtless, therefore, used a more violent motion with his arms and hands than is common with us. And Cicero calls the arm projected, the orator's weapon. Indeed, to extend or brandish the arm, carries in it an air of command and authority, which was not unbecoming the character of Philip, who was a person of the highest rank and quality. And therefore young orators, both among the Greeks and Romans, for a time used no motion of the arm, but kept it confined in their garment, as an argument of modesty, till age and experience allowed them to use greater freedom. Nor was it uncommon for the ancient orators to express the excess of their passions by tears. They thought nothing unbecoming that was natural; and judged it agreeable to the characters even of the bravest men, to be touched with a sense of humanity in great calamities: and therefore we find both Homer and Virgil make their greatest heroes shed tears on some occasions.

The other sort of gestures above mentioned are such as rise from imitation: as where the orator describes some action, or personates another speaking. But here great care is to be taken not to

ever act his part, by running into any ludicrous or theatrical mimicry. It is sufficient for him so to represent things of this nature, as may best convey the image of them in a lively manner to the minds of the hearers; without any such change either of his actions or voice as are not suitable to his own character.

Chap. III, *Some particular Rules for the Voice and Gesture.*

The subject of pronunciation is of so great importance to an orator, that it can neither be too clearly laid down, nor too strongly inculcated. If we inquire into the causes of that surprising power it has over us, and by what means it so strongly affects us, this may in some measure appear by reflecting on the frame and constitution of human nature. For our infinitely great and wise maker has so formed us, that not only the actions of the body are subject to the direction of the mind, but we are likewise endowed with various passions and affections, that excite us to pursue those things which Make for our happiness, and avoid others which are hurtful to us. And as we are made for society, we are also furnished with speech, which enables us to converse one with another. And such is the contrivance of our make, and influence of our minds upon the mechanism of our bodies, that we can not only communicate our thoughts to each other, but likewise our passions. For, as Cicero well observes, "Every motion of the mind has naturally its peculiar countenance, voice, and gesture; and the whole body, every position of the face, and sound of the voice, like the strings of an instrument, act agreeably to the impression they receive from the mind." Nor is this all: but as every one is differently affected himself, he is capable of making the like impressions upon others, and excite them to the same motions which he feels in himself. As when two instruments are set to the same pitch, the strings of the one being touched, produce in the other the like sound. This common sympathy in the human frame shows how necessary it is that an orator should not only in general be well acquainted with the rules of pronunciation, but likewise know how to use them as occasion requires. For a general knowledge of the rules of art is not of itself sufficient to perfect an artist, without a further acquaintance with the particular application of them to their several cases and circumstances. Thus, for instance, it is not enough for an orator to understand all the beauties and ornaments of language, and which of them are suited to form the several kinds of style, unless he can likewise accommodate each of those characters to their proper subject. And so likewise in pronunciation, he ought not only to know the several qualities of the voice, and proper gestures of the body, but also when and where to make use of them. For not only different subjects, but also different parts of the same discourse, and even particular expressions, often require a difference in the manner of pronunciation, both as to the voice and gesture. Having therefore treated on both these parts of pronunciation in general, it may not be amiss now to consider how they are to be applied in each of the two respects last mentioned.

We shall begin with the parts of a discourse, and treat of them in their natural order. And here the view and design of the speaker in each of them will easily help us to see the proper manner of pronunciation.

Let us suppose then a person presenting himself before an assembly, in order to make a discourse to them. It cannot be decent immediately to begin to speak so soon as ever he makes his appearance. He will first settle himself, compose his countenance, and take a respectful view of his audience. This prepares them for silence and attention. To begin presently, and hurry on, without first allowing either himself or his hearers time to compose themselves, looks as if he was rather performing a task than had any design to please them; which will be very apt to make them as uneasy till he has done, as he seems to be himself. Persons commonly form some opinion of a speaker from their first view of him, which prejudices them either in his favour, or otherwise, as to what he says afterwards. A grave and sedate aspect inclines them to think him serious; that he has considered his subject, and may have something to offer worth their attention. A haughty and forbidding air occasions distaste, as it looks like disrespect. A wandering giddy countenance argues levity. A dejected drooping appearance is apt to raise contempt, unless where the subject is melancholy. And a cheerful aspect is a proper prelude to a pleasant and agreeable argument.

To speak low at first has the appearance of modesty, and is best for the voice; which, by rising gradually, will with more ease be carried to any pitch that may be afterwards necessary, without straining it. However some variation of the voice is always proper to give it an harmony. Nay, and sometimes it is not improper for an orator to set out with a considerable degree of warmth, expressed by such an elevation of the voice, and gestures of the body, as are suited to represent the emotions of his mind. But this is not ordinarily the case. We have some few instances of this in Cicero; as in his oration for Roscius Amerinus, where the heinousness of the charge could not but excite his indignation against the accusers. And so likewise in that against Piso, and the two first against Catiline, which begin in the same manner, from the resentment he had conceived against their persons and conduct.

In the narration, the voice ought to be raised to somewhat an higher pitch. Matters of fact should be related in a very plain and distinct manner, with a proper stress and emphasis laid upon each circumstance, accompanied with a suitable address and motions of the body, to engage the attention of the hearers. For there is a certain grace in telling a story, by which those who are masters of it seldom fail to recommend themselves in conversation. The beauty of it consists in an easy and familiar manner of expression, attended with such actions and gestures as are suited to the nature of the things related, and help to enliven each particular circumstance and part of the discourse.

The proposition, or subject of the discourse, should be delivered with a very clear and audible voice. For if this be not plainly heard, all that follows in proof of it cannot well be understood. And for the same reason, if it be divided into several parts or branches, they should each be expressed very deliberately and distinctly. But as the design here is only information, there can be little room for gesture.

The confirmation admits of great variety both of the voice and gestures. In reasoning, the voice is quick and pungent, and should be enforced with suitable actions. And as descriptions likewise

have often a place here, in painting out the images of things, the orator should so endeavour to adapt both his voice, and the motions of his body, particularly the turn of his eyes, and action of his hands, as may best help the imagination of his hearers. Where he introduces another person speaking, or addresses to an absent person, it should be with some degree of imitation. And in dialogue the voice should alter with the parts. When he diverts from his subject by any digression, his voice should be lively and cheerful; since that is rather designed for entertainment than instruction.

In confutation, the arguments of the adverse party ought first to be repeated in a plain and distinct manner, that the speaker may not seem to conceal or avoid the force of them. Unless they appear trifling, and unworthy of a serious answer; and then a facetious manner, both of expression and gesture, may be the properest way to confute them. For to attempt to answer in a grave and serious manner, what is in itself empty and ludicrous, is apt to create a suspicion of its having more in it than it really has. So when Tubero, in his accusation of Ligarius before Cæsar, had made it part of his charge, that Ligarius was in Africa during some part of the civil war between Cæsar and Pompey; Cicero, in his answer, not thinking it deserved a serious reply, contents himself with barely mentioning it ironically. For thus he begins his defence of Ligarius: "Cæsar, my kinsman Tubero has laid before you a new crime, and till this day unheard of, that Q. Ligarius was in Africa." Every one must easily perceive, by the manner in which these words were pronounced, that the design of them was to make the charge appear ridiculous. But caution should be used not to represent any argument of weight in a ludicrous way, lest by so doing the speaker should more expose himself than his adversary.

In the conclusion, both the voice and gesture should be brisk and sprightly, which may seem to arise from a sense of the speaker's opinion of the goodness of his cause, and that he has offered nothing but what is agreeable to reason and truth; as likewise from his assurance that the audience agree with him in the same sentiments. In every undertaking that requires care and thought, persons are apt at first to be sedate and moderate; but when it is drawn to an end, and is near finished, it is very natural to appear more gay. If an enumeration of the principal arguments of the discourse be convenient, as it sometimes is, where they are pretty numerous, or the discourse is long, they ought to be expressed in the most clear and forcible manner. And if there be an address to the passions, both the voice and gesture must be suited to the nature of them, of which more will be said presently.

We proceed now to the consideration of particular expressions. And what we shall offer here, will be first in relation to single words, then sentences, and lastly the passions.

I. Even in those sentences which are expressed in the most even and sedate manner, there is often one or more words which require an emphasis and distinction of the voice. Pronouns are often of this kind; as, "This is the man." And such are many words that denote the circumstances and qualities of things. Such as heighten or magnify the idea of the thing to which they are joined, elevate the voice; as noble, admirable, majestic, greatly, and the like. On the contrary, those which lessen the idea, or debase it, depress the voice, or at least protract the tone; of which sort are the words, little, mean, poorly, contemptible; with many others. Some tropes likewise, as metaphors and verbal figures, which consist in the repetition of a single word, should have a particular emphasis. As when Virgil says of the river Araxes, "It disdained a bridge." And Nisus of himself, in the same poet, "I, I am the man:" where the repeated word is loudest. This distinction of words, and giving them their proper emphasis, does not only render the expression more clear and intelligible, but very much contributes to the variation of the voice, and the preventing a monotony. And the different pronunciation of these words will also require a peculiar gesture.

II. In sentences, regard should be had to their length, and the number of their parts, in order to distinguish them by proper pauses. The frame and structure of the period ought likewise to be considered, that the voice may be so managed as to give it the most musical accent. Unless there be some special reason for the contrary, it should end louder than it begins. And this difference of tone between the end of the former sentence and the beginning of the next not only helps to distinguish the sense, but adds to the harmony of the voice. And that the last syllables of a sentence might become more audible and distinct, was doubtless one reason why the ancient rhetoricians dislike short feet at the end of a period. In an antithesis, or a sentence consisting of opposite parts, one contrary must be louder than the other. As, "He is gone, but by a gainful remove, from *painful labour* to *quiet rest*; from *unquiet desires* to happy *contentment*; from *sorrow* to *joy*; and from *transitory time* to *immortality*." In a climax or gradation, the voice should rise with it. So, "There is no enjoyment of *property* without *government*; no *government* without a *magistrate*; no *magistrate* without *obedience*; no *obedience* where every one acts as he *pleases*." And so in other gradations of a different form. As, "Since *concord* was lost, *friendship* was lost, *fidelity* was lost, *liberty* was lost, *all* was lost." And again, "You would pardon him whom the *senate* hath condemned, whom *the people of Rome* have condemned, whom all *mankind* have condemned." We might mention several other figurative expressions, which require a particular conformation and management of the voice; but these, we presume, with some others we shall have occasion to name presently when we come to the passions, may be sufficient to guide us in the rest. But that it may appear more evidently how necessary a different inflection and variation of the voice is in most sentences, give us leave to show how Quintilian illustrates it, by a passage which he takes from Cicero. The place is the beginning of Cicero's defence for Milo, and the words are these: "Although I am apprehensive it *may* seem base to discover fear when I enter upon the defence of a *most courageous man*, and it may appear very indecent, *when Milo discovers more concern for the public safety than for his own*, not to show a greatness of mind equal to his cause, yet this new form of the court terrifies my eyes, *which cannot discern the ancient manner of the forum, and former custom of trials*, whatever way they look: *your bench is not surrounded with its usual attendants*." This sentence consists of four members. And Quintilian supposes, that though these words are the beginning of a speech, and were accordingly expressed in a calm and submissive manner, yet that the orator used a great deal of variety in the pronunciation of their several parts. In

the first member (as he imagines) his voice was more elevated in expressing the words, *a most courageous man*, than in those other parts of it, *I am apprehensive it may seem base*, and, *to discover fear*. In the second member he rose higher, in saying *when Milo discovers more concern for the public safety than for his own*; and then again, as it were, checked himself in what follows, *not to show a greatness of mind equal to his cause*. The beginning of the third member, carrying a reflection in it, was spoke with a different tone of the voice, *this new form of the court terrifies my eyes*; and the other part of it more loud and distinctly, *which cannot discern the ancient manner of the forum, and former custom of trails*. And the last member was still more raised and audible, *your bench is not surrounded with its usual attendants*. And it must be supposed, that while he was saying this, he cast his eyes round the assembly, and viewed the soldiers whom Pompey had placed there, which renders the expression still more grave and solemn. If this was the manner of the ancient orators, and they were so exact and accurate in expressing their periods, and the several parts of them, as we have reason to believe they were, it must have given a very great force, as well as beauty, to their pronunciation.

III. That the passions have each of them both a different voice and action, is evident from hence; that we know in what manner a person is affected, by the tone of his voice, though we do not understand the sense of what he says, or many times so much as see him; and we can often make the same judgment from his countenance and gestures. Love and esteem are expressed in a smooth and cheerful tone; but anger and resentment with a rough, harsh, and interrupted voice; for when the spirits are disturbed and ruffled, the organs are moved unequally. Joy raises and dilates the voice, as sorrow sinks and contracts it. Cicero takes notice of a passage in an oration of Gracchus, wherein he bewails the death of his brother, who was killed by Scipio, which in his time was thought very moving: "Unhappy man (says he), whither shall I betake myself? where shall I go? *Into the capitol?* that flows with my brother's blood. *Shall I go home?* and behold my unhappy mother all in tears and despair?" Though Gracchus had a very ill design in that speech, and his view was to excite the populace against their governors, yet (as Cicero tells us) when he came to this passage, he expressed himself in such moving accents and gestures, that he extorted tears even from his enemies. Fear occasions a tremor and hesitation of the voice, and assurance gives it strength and firmness. Admiration elevates the voice, and should be expressed with pomp and magnificence: "O surprising clemency, worthy of the highest praise and greatest encomiums, and fit to be perpetuated in lasting monuments!" This is Cicero's compliment to Cæsar, when he thought it for his purpose. And oftentimes this passion is accompanied with an elevation both of the eyes and hands. On the contrary, contempt sinks and protracts the voice. In the dispute between Cicero and Cecilius, which of them should accuse Verres, Cicero puts this contemptuous question to him: "How are you qualified, Cecilius, for such an undertaking? I will not ask, when you ever gave a proof of it; but when you so much as attempted it? Do you consider the difficulty of managing a public cause?" with much more to the same purpose. Though such kind of expressions require little gesture, yet sometimes a motion of the hand may not be improper, to signify disdain or aversion. We may suppose Cicero to have acted thus in his defence of Rabirius. For to show his assurance of his client's cause, having used this expression in a very audible manner, "I wish I had it to say, that Rabirius had with his own hand killed Saturninus, who was an enemy to the Roman state," some persons in the crowd began to raise a clamour, just as of later times hissing has been practised on the like occasions. Upon which Cicero immediately replies, "This noise does not disturb me but please me, since it shows, though there are some weak persons, yet they are but few." Then presently after follows the expression we refer to: "Why do not you cease your clamour, since it only discovers your folly, and the smallness of your numbers?" All exclamations should be violent. When we address inanimate things, the voice should be higher than when to animated beings; and appeals to heaven must be made in a loftier tone than those to men.

These few hints for expressing the principal passions may, if duly attended to, suffice to direct our practice in others. Though, after all, it is impossible to gain a just and decent pronunciation of voice and gesture merely from rules, without practice and an imitation of the best examples. Which shows the wisdom of the ancients in training up their youth to it, by the assistance of masters, to form both their speech and actions.

But there is one thing which ought always to be attended to; namely, that persons should well consider their own make and genius, especially with respect to the passions. We seldom find, that any actor can excel in all characters; but if he performs one well, he is deficient in another: and therefore they are commonly so prudent as to confine themselves to such as best suit them. The case is the same in an orator; who should therefore keep within those bounds which nature seems to have prescribed for him. Some are better fitted for action than others; and most for some particular actions rather than others; and what sits well upon one would appear very awkward in another. Every one, therefore, should first endeavour to know himself, and manage accordingly. Though in most cases, nature may be much assisted and improved by art and exercise. See Professor Ward's System of Oratory.

ORATORY, among the Romanists, a closet or like apartment near a bed-chamber, furnished with an altar, crucifix, &c. for private devotions.

ORB. *s.* (*orbe*, French; *orbis*, Latin.) 1. Sphere; orbicular body (*Woodward*). 2. Circular body (*Dryden*). 3. Mundane sphere; celestial body (*Shakspeare*). 4. Wheel; any rolling body (*Milton*). 5. Circle; line drawn round (*Holiday*). 6. Circle described by any of the mundane spheres (*Bacon*). 7. Period; revolution of time (*Milton*). 8. Sphere of action (*Shakspeare*).

ORBATION. *s.* (*orbatus*, Latin.) Privation of parents or children.

O'RBED. *a.* (from *orb*.) 1. Round; circular; orbicular (*Shakspeare*). 2. Formed into a circle (*Milton*). 3. Rounded (*Addison*).

ORBI'CULAR. *a.* (*orbiculaire*, French.) 1. Spherical (*Milton*). 2. Circular (*Newton*).

ORBICULARE OS. (*orbicularis*, shaped like a ring, from *orbiculus*, a little ring.) In

anatomy, a very small round bone, not larger than a pin-head, that belongs to the internal ear.

ORBICULARIS ORIS. (*musculus orbicularis oris*, from *orbiculus*, a little ring; so called from its shape.) In myology. Sphincter labiorum of Douglas. Semi orbicularis of Winslow. Constrictor oris of Cowper. A muscle of the mouth, formed in a great measure by those of the lips; the fibres of the superior descending, those of the inferior ascending and decussating each other about the corner of the mouth, they run along the lip to join those of the opposite side, so that the fleshy fibres appear to surround the mouth like a sphincter. Its use is to shut the mouth, by contracting and drawing both lips together, and to counteract all the muscles that assist in forming it.

ORBICULARIS PALPEBRARUM. (*orbicularis, scil. musculus.*) A muscle common to both the eyelids. It arises by a number of fleshy fibres from the outer edge of the orbitar process of the superior maxillary bone, and from a tendon near the inner angle of the eye; these fibres run a little downwards and outwards, over the upper part of the cheek, below the orbit, covering the under eyelid, and surround the external angle, being closely connected only to the skin and fat; they then run over the superciliary ridge of the os frontis, towards the inner canthus, where they mix with the fibre of the occipito-frontalis and corrugator supercilii; then covering the upper eyelid, they descend to the inner angle opposite to their inferior origin, and firmly adhere to the internal angular process of the os frontis, and to the short round tendon which serves to fix the palpebræ and muscular fibres arising from it. It is inserted into the nasal process of the superior maxillary bone by a short round tendon, covering the anterior and upper part of the lachrymal sac, which tendon can be easily felt at the inner canthus of the eye. The use of this muscle is to shut the eye, by drawing both lids together, the fibres contracting from the outer angle towards the inner, press the eyeball, squeeze the lachrymal gland, and convey the tears towards the puncta lachrymalia.

ORBI'CULARLY. *ad.* (from *orbicular.*) Spherically; circularly.

ORBI'CULARNESS. *s.* (from *orbicular.*) The state of being orbicular.

ORBI'CULATED. *a.* (*orbiculatus*, Latin.) Moulded into an orb.

ORBILIUS PUPILLUS, a grammarian of Beneventum, who was the first instructor of the poet Horace. He came to Rome in the consulship of Cicero, and there, as a public teacher, acquired more fame than money. He was naturally of a severe disposition. He lived almost to his 100th year, and lost his memory some time before his death.

ORBIT, in astronomy, the path of a planet or comet, or the curve that it describes, in its revolution round its central body: thus the earth's orbit is the curve which it describes in its annual course, and usually called the ecliptic. The orbits of all the planets are ellipses having the sun in their common focus; in which curve they move according to an invariable law. See ASTRONOMY. However, the orbit of the earth is considerably disfigured by the action of the moon; as is also the orbit of Saturn by the action of Jupiter, when they happen to be in conjunction. Though the orbits of the planets be elliptical, not circular, yet that they are very little so, even in the most eccentric orbit, as that of Mercury, will appear by comparing their eccentricities with their mean distances from the sun. The orbits of the planets are not all in the same plane with the ecliptic, but are variously inclined to it, and to each other; but still the plane of the ecliptic intersects the plane of the orbit of every other planet, in a right line which passes through the sun, called the line of the nodes, and the points of intersection of the orbits themselves are called the nodes.

ORBITS. (*orbita.*) The two conoid cavities under the forehead, in which the eyes are situated, are so termed. The angles of the orbits are called *canthi*. Each orbit is composed of seven bones, viz. the frontal, maxillary, jugal, lachrymal, ethmoid, palatine, and sphænoid. The use of this bony socket is to maintain and defend the organ of sight, and its adjacent parts.

ORBITELLO, a seaport of Italy, capital of Stato delli Presidii, with a good harbour protected by several forts. It is seated on the Mediterranean, near the mouth of the Albegna, 68 miles S. by W. of Sienna. Lon. 11. 6 E. Lat. 42. 28 N.

O'RBITY. *s.* (*orbus*, Latin.) Loss, or want of parents or children (*Bacon*).

ORCADES. See ORKNEYS.

ORCHAL. See LICHEN ROCCELLA.

ORCHARD, in horticulture, a portion of garden-ground set apart for the growth of different sorts of common fruit-trees. These are commonly of the standard kind, especially in districts where large supplies of fruit are wanted, and generally consist of apple-trees, pear-trees, plum-trees, and cherry-trees; and to render the orchard more complete, should contain quinces, medlars, mulberries, service-trees, filberts, Spanish-nuts, barberries, walnuts, and chesnuts. As the two last sorts are well adapted for sheltering the others from high winds, Mr. Forsyth advises that they be planted in the boundaries of the orchard, a little closer than ordinary for that purpose.

In providing trees, especially of the apple-kind, too much care cannot be taken to admit of none but such as have good sorts, fair, clear stems, and proper heads; and at the same time attention should be paid that a proper assortment of the different kinds be procured for the supply of the table during the whole year: a few of the summer sorts are sufficient, but there should be a larger allotment of the autumn, and still a larger quantity of the winter kind; as upon this last the chief dependance must be placed from the beginning of the year, till nearly the period in which the fruit will be ready again. In planting an orchard great care

should be taken that the soil is suitable to the trees planted in it; and that they are procured from a soil nearly of the same kind, or rather poorer than that laid out for an orchard. As to the situation, an easy rising ground, open to the south-east, is to be preferred. Mr. Miller recommends planting the trees fourscore feet asunder, but not in regular rows; and would have the ground between the trees plowed, and sown with wheat and other crops, in the same manner as if it was clear from trees; by which means the trees will be more vigorous and healthy, will abide much longer, and produce better fruit. If the ground have been pasture, the green sward should be plowed in the spring before the trees are planted; and if it is suffered to lie a summer fallow, it will greatly mend it, provided it is stirred two or three times to rot the grass, and prevent the growing of weeds. At Michaelmas it should be plowed pretty deep, in order to make it loose for the roots of the trees, which, if the soil is dry, should be planted in October; but if it is moist, the beginning of March will be a better season. If several sorts of fruit-trees are to be planted on the same spot, you should observe to plant the largest-growing trees backwards, and so proceed to those of less growth, continuing the same method quite through the whole plantation; by which means the sun and air will more easily pass through the whole orchard. When you have planted the trees, you should support them with stakes, to prevent their being blown out of the ground by the wind; and the following spring, if the season should prove dry, cut a quantity of green turf, and lay it about the roots, with the grass downwards; by which means a great expence of watering will be saved, and after the first year they will be out of danger. Whenever you plow the ground betwixt these trees, you must be careful not to go too deep amongst their roots, which would greatly damage the trees; but if you do it cautiously, your stirring the face of the ground will be of great service to them; though you should observe never to sow too near the tree, nor to suffer any great rooting weeds to grow about them; because this would starve them, by exhausting the goodness of the soil, which every two or three years should be mended with dung or other manure. These trees, after they are planted out, will require no other pruning besides cutting off their bad branches, or such as cross each other.

ORCHESTRA. This name was applied by the ancient Greeks to a certain circular part of the theatre where the dances were performed. At Rome the orchestra was separated from the parts occupied by the performers, and furnished with seats appropriated to the senators, magistrates, vestals, and other persons of distinction. At present we understand by the word orchestra, that enclosed part of the theatre between the audience and the curtain, in which the instrumental performers sit. We, however, sometimes transfer the word from the place to the performers themselves: as when we say "that theatre has a well-appointed, or a powerful orchestra."

ORCHIA LEX, instituted by Orchius the tribune in the year of Rome 566. Its intention was to limit the number of guests that were to be admitted at an entertainment; and it also enforced, that during supper, which was the chief meal among the Romans, the doors of every house should be left open.

ORCHIDEÆ. In botany, the name of the fourth order in Linnéus's Fragments; and of the seventh in his Ordines Naturales; containing orchis and other genera allied to it.

ORCHILLA, a small island of the Caribbean sea, 80 miles N. of the coast of Terra Firma. Lon. 65. 20 E. Lat. 12. 0 N.

ORCHIS, (ορχις, from ορεγομαι, to desire.) In anatomy, a testicle. Also a plant whose roots resemble the testicles. See ORCHIS, in botany.

ORCHIS. Fool's-stones. In botany, a genus of the class gynandria, order diandria. Nectary consisting of a horn-like spur behind the flower. Forty-nine species scattered over the globe; of which nine are common to our own country. They may be thus subdivided:

A. Helmet of the corol spurred.
B. Bulbs undivided.
C. Bulbs palmate.
D. Bulbs fascicled.
E. Bulbs not yet ascertained.

The following are those chiefly cultivated:

1. O. bifolia. Butterfly orchis.
2. O. murio. Female or meadow orchis.
3. O. mascula. Male, or early spotted orchis.
4. O. militans. Man orchis.
5. O. latifolia. Broad-leaved or marsh orchis.
6. O. maculata. Spotted orchis.
7. O. conopsea. Long-spurred orchis.
8. O. abortiva. Purple bird's-nest, or bird's-nest orchis.

The first is found in the groves of our own country, with undivided bulb; lip of the nectary lanceolate, quite entire; spur very long; lateral petals spreading. The second has also undivided bulbs, and connivent, many-seeded petals. It is from the roots of this species that the salep of the shops is manufactured. The fourth is usually called satyrion. Its root has a place in the Edinburgh Pharmacopœia, on account of its slimy juice.

All the species are hardy perennials. The flowers appear in May, June, and July; in June principally. The uniform mode of flowering is in spikes; many flowers in each spike; and each flower composed of five petals in two series, and a nectary. The season for removing them is in the summer after they have done flowering, when their leaves and stalks decay: plant them three inches deep, and let them remain undisturbed several years; for the less they are removed the stronger will they flower.

ORCHITIS. (ορχιτις, from ορχις, a testicle.) Inflammatio testis. Hernia humoralis. An inflammation of the testicle.

ORCHOMENUS, or ORCHOMENUM, a town of Bœotia, anciently called Minyeia; and, from that circumstance, the inhabitants were often called Minyans of Orchomenos. There was at Orchomenos a celebrated temple sacred to the Graces.—2. A town of Arcadia, at the north of Mantinea.—3. A son of Minyas, king of Bœotia, who gave the name of Orchomenians to his subjects.

ORCHOTOMY. (ορχοτομια, from ορχις, a testicle, and τεμνω, to cut.) Castration. The operation of extracting a testicle.

ORCUS, one of the names of the god of hell, the same as Pluto, though confounded by some with Charon. The word Orcus is generally used to signify the infernal regions.

ORD. *s.* An edge. *Ord*, in English, signifies *beginning*.

To ORDA'IN. *v. a.* (*ordino*, Latin.) 1. To appoint; to decree (*Dryden*). 2. To establish; to settle; to institute (*Shakspeare*). 3. To set in an office (*Esther*). 4. To invest with ministerial function, or sacerdotal power (*Stillingfleet*).

ORDA'INER. *s.* (from *ordain.*) He who ordains.

ORDEAL. (*ordalium.*) A form of trial, that is, of discovering innocence or guilt; practised, in England, in the time of Edward the Confessor; and since, as low as king John and king Henry III.

The word, in the original Saxon, signifies a great judgment, formed of *or*, great, and *deal*, or *dele*, judgment.

It was called *purgatio vulgaris*, or *judicium Dei*, in opposition to *bellum* or *combat*, the other form of purgation: and also to the canonical purgation, which was by the oath of the party.

The ordeal was of various kinds, viz. that of fire, that of red-hot iron, that of cold water, that of judicial pottage, that of hallowed cheese, that of boiling water, that of a green cross, and that of dice laid on relics, covered with a woollen cloth. There were particular masses for each species of ordeal.

The more popular kinds of ordeal were those of red-hot iron, and water: the first for freemen and people of fashion; the second for peasants.

Fire-ordeal was performed either by taking up in the hand, unhurt, a piece of red-hot iron, of one, two, or three pounds weight; or else by walking barefoot and blindfold, over nine red-hot plough-shares, laid lengthwise, at unequal distances; and if the party escaped without injury, he was adjudged innocent; but if it happened otherwise, as without collusion it generally did, he was then condemned as guilty.

It is a popular story, in our histories, that Emma, mother of Edward the Confessor, being accused of too much familiarity with Alwyn, bishop of Winchester, demanded the ordeal or red-hot iron; and passed bare-footed and hood-winked over nine red-hot ploughshares, without touching any of them.

Water-ordeal was performed either by plunging the bare arm up to the elbow in boiling water, and escaping unhurt; or by casting the person suspected into a river or pond of cold water, and if he floated therein, without any action of swimming, it was deemed an evidence of his guilt, but if he sunk he was acquitted.

It is easy to trace out the traditional relics of this water-ordeal, in the ignorant barbarity still practised in many countries, to discover witches, by casting them into a pool of water, and drowning them to prove their innocence. This purgation by ordeal seems to have been very ancient, and very universal, in the times of superstitious barbarity. It was known to the ancient Greeks, vide Antigone of Sophocles, v. 270. And Grotius Com. on Numb. v. 17. gives many instances of water-ordeal, in Bithynia, Sardinia, and other places.

It was very anciently known in Persia, and perhaps originated from their superstitious veneration for fire. Records of trial by ordeal remain above 500 years before the Christian æra. It is still in practice, where satisfactory evidence cannot be obtained, among the Gentoos, in Hindustan, and of very high antiquity. It is mentioned several times in the code of Gentoo laws, as a common mode of proof. The modes of this ordeal are various in India, according to the choice of the party, or nature of the offence; but the infallibility of the result is to this day as implicitly believed, as it could have been in the darkest ages of antiquity. See chap. iii. of the Code of Gentoo Laws, by Halhed.

The most respectable authors, ancient and modern, attribute the invention of water-ordeal, in the Christian church, to pope Eugenius II. though Le Brun, a priest of the Oratory, maintains, that it was more ancient.—However this be, the custom was condemned and abrogated, by the authority of Lewis the Meek, about the year 829. It was afterwards revived and practised in the 10th, 11th, and 12th centuries.

The first account we have of Christians appealing to the fire ordeal, as a proof of their innocence, is that of Simplicius, bishop of Autun, who lived in the fourth century. This prelate, as the story is related, before his promotion to the episcopal order, had married a wife, who loved him tenderly, and who, unwilling to quit him after his advancement, continued to sleep in the same chamber with him. The sanctity of Simplicius suffered, at least in the voice of fame, by the constancy of his wife's affection; and it was rumoured about, that the holy man, though a bishop, persisted, in opposition to the ecclesiastical canons, to taste the sweets of matrimony: upon which, his wife, in the presence of a great concourse of people, took up a considearble quantity of burning coals, which she held in her clothes, and applied to her breasts, without the least hurt to her person or her garments, as the legend says, and her example being followed by her husband, with the like success, the silly multitude admired the miracle, and proclaimed

the innocence of the loving pair. A similar trick was played by St. Brice in the fifth century.—Mosh. Eccl. Hist. vol. ii. p. 169. n. f. Eng. ed. 1768.

The practice of ordeal obtained very generally, in more modern times; and even in England, so late as king John's time, we find grants to the bishops and clergy to use the *judicium ferri, aquæ, et ignis*. And both in England and Sweden, the clergy persided at this trial, and it was only performed in the churches or in other consecrated ground. However the canon law declared, very early, against trial by ordeal, as being the fabric of the devil. Upon this authority, though the canons themselves were of no validity in England, it was thought proper (as had been done in Denmark, above a century before) to disuse and abolish this trial entirely in our courts of justice, by an act of parliament, in 3 Hen. III. according to sir Edward Coke, or rather by an order of the king in council. Blackst. Com. vol. iv. p. 338, &c.

It will still perhaps be a postulatum with some of our readers how the effects of these trials were evaded, and how it was possible to appear to do, what we know could not be really done, without material injury to the persons concerned: and here we find the subject so well handled by the learned historian whom we have already quoted, as far as concerns the ordeals in ancient Britain, which *mutatis mutandis* will answer for others, that we shall finish the article, which has already extended we fear to too great a length, in his words: "If we suppose that few or none escaped conviction who exposed themselves to those fiery trials, we shall be very much mistaken. For the histories of those times contain innumerable examples of persons plunging their naked arms into boiling water, handling red-hot balls of iron, and walking upon burning ploughshares, without receiving the least injury. Many learned men have been much puzzled to account for this, and disposed to think that Providence graciously interposed, in a miraculous manner, for the preservation of injured innocence. But if we examine every circumstance of those fiery ordeals with due attention, we shall see sufficient reason to suspect that the whole was a gross imposition on the credulity of mankind. The accused person was committed wholly to the priest who was to perform the ceremony three days before the trial, in which he had time enough to bargain with him for his deliverance, and give him instructions how to act his part. On the day of trial, no person was permitted to enter the church but the priest and the accused till after the iron was heated, when twelve friends of the accuser, and twelve of the accused, and no more were admitted, and ranged along the wall on each side of the church, at a respectful distance. After the iron was taken out of the fire, several prayers were said; the accused drank a cup of holy water and sprinkled his hand with it, which might take a considerable time, if the priest was indulgent. The space of nine feet was measured by the accused himself with his own feet, and he would probably give but scanty measure. He was obliged only to touch one of the marks with the toe of his right foot, and allowed to stretch the other foot as far towards the other mark as he could, so that the conveyance was almost instantaneous. His hand was not immediately examined, but wrapped up in a cloth prepared for that purpose three days. May we not then, from all these precautions, suspect that these priests were in possession of some secret that secured the hand from the impressions of such a momentary touch of hot iron, or removed all appearances of these impressions in three days; and that they made use of this secret when they saw reason? Such readers as are curious in matters of this kind may find two different directions for making ointments that will have this effect, in Du Cange, Glass. t. 3. p. 397. What greatly strengthens these suspicions is, that we meet with no example of any champion of the church who suffered the least injury from the touch of hot iron in this ordeal; but when any one was so fool-hardy as to appeal to it, or to that of hot water, with a view to deprive the church of any of her possessions, he never failed to burn his fingers, and lose his cause."

O'RDER. *s.* (*ordo*, Latin.) 1. Method; regular disposition (*Bacon*). 2. Established process (*Watts*). 3. Proper state (*Locke*). 4. Regularity; settled mode (*Daniel*). 5. Mandate; precept; command (*Clarendon*). 6. Rule; regulation (*Hooker*). 7. Regular government (*Daniel*). 8. A society of dignified persons distinguished by marks of honour (*Bacon*). 9. A rank, or class (*Kings*). 10. A religious fraternity (*Shakspeare*). 11. (Plural.) Hierarchical state (*Dryden*). 12. Means to an end (*Taylor*). 13. Measures; care (*Spenser*).

Order, in architecture, is a system of the several members, ornaments, and proportions of columns and plaisters; or a regular arrangement of the projecting parts of a building, especially the column, so as to form one beautiful whole. See Architecture.

Order is also used for a division or class of any thing; thus the tribe of animals called birds is subdivided into six orders. See Ornithology, Zoology, &c.

Order, in rhetoric, is the placing of each word and member of a sentence in such a manner, as will most contribute to the force, beauty, or evidence of the whole; according to the genius and custom of different languages. With regard to order, we may observe in general, that, in English, the nearer we keep to the natural or grammatical order, it is generally the best; but in Latin, we are to follow the use of the best writers; a joint regard being always had to the judgment of the ear, and the perspicuity of the sense, in both languages.

Order is also used for a class or division of the members of the body of a state; with regard to assemblies, precedency, &c. In this sense, order is a kind of dignity, which, under the same name, is common to several persons; and

which, of itself, does not give them any particular authority, but only rank, and a capacity of arriving at honours and employments. To abridge this definition, order may be said to be a dignity attended with an aptitude for public employ. By which it is distinguished from an office, which is the exercise of a public trust. In this sense, nobility is an order, &c. The clericate is also an order, &c.

Order is also the title of certain ancient books, containing the divine office, with the order and manner of its performance. Roman order is that wherein are laid down the ceremonies which obtain in the Romish church. See Ritual.

Order, in natural history, is a name given to a subdivision of classes in the Linnéan system. See Botany, and Ordo.

Orders, by way of eminency, or holy orders, denote a character peculiar to ecclesiastics, whereby they are set apart for the ministry. This the Romanists make their sixth sacrament.

In the reformed churches there are but three orders; viz. bishops, priests, and deacons. In the Romish church there are seven, exclusive of the episcopate: all which the council of Trent enjoins to be received, and believed, on pain of anathema.

They are distinguished into petty, or secular orders; and major, or sacred orders.

Orders, or Ordination. No person shall be admitted to the holy order of deacon under 23 years of age; nor to the order of priest unless he is 24 complete; and none shall be ordained without a title, that is, a nomination to some cure or benefice, and he shall have a testimonial of his good behaviour, for three years past, from three clergymen; and the bishop shall examine him, and if he sees cause may refuse him. And before he is ordained, he shall take the oath of allegiance and supremacy before the ordinary, and subscribe the thirty-nine articles.

Orders (Religious), societies of monastics living under the same superior, in the same manner, and wearing the same habit. Religious orders may be reduced to five kinds; viz. monks, canons, knights, mendicants, and regular clerks. (See Monk, Canon, &c.) Father Mabillon proves, that till the ninth century almost all the monasteries in Europe followed the rule of St. Benedict; and that the distinction of orders did not commence till upon the reunion of several monasteries into one congregation: that St. Odo, abbot of Cluny, first began this reunion, bringing several houses under the dependence of Cluny: that, a little afterwards, in the 11th century, the Camaldulians arose; then by degrees, the congregation of Vallombrosa; the Cistercians, Carthusians, Augustines; and at last, in the 13th century the Mendicants. He adds, that Lupus Servatus, abbot of Ferrieres, in the ninth century, is the first that seems to distinguish the order of St. Benedict from the rest, and to speak of it as a particular order.

Order (White), denotes the order of regular canons of St. Augustine. See Augustine.

Order (Black), denoted the order of Benedictines. These names were first given these two orders from the colour of their habit; but are disused since the institution of several other orders, who wear the same colours.

Order (Grey), was the ancient name of the Cistercians.

To O'rder. *v. a.* (from the noun.) 1. To regulate; to adjust; to manage; to conduct (*Psalms*). 2. To manage; to procure (*Spenser*). 3. To methodise; to dispose fitly (*Chronicle*). 4. To direct; to command. 5. To ordain to sacerdotal function (*Whitgift*).

To O'rder. *v. n.* To give command; to give direction (*Milt...*).

O'RDERER. *s.* (from *order*.) One that orders, methodises, or regulates (*Suckling*).

O'RDERLESS. *a.* (from *order*.) Disorderly; out of rule (*Shakspeare*).

O'RDERLINESS *s.* (from *orderly*.) Regularity; methodicalness.

O'RDERLY. *a.* (from *order*.) 1. Methodical; regular (*Hooker*). 2. Observant of method (*Chapman*). 3. Not tumultuous; well regulated (*Clarendon*). 4. According with established method (*Hooker*).

O'rderly. *ad.* (from *order*.) Methodically; according to order; regularly (*Sandys*).

O'RDINABLE. *a.* (*ordino*, Latin.) Such as may be appointed (*Hammond*).

O'RDINAL. *a.* (*ordinal*, Fr. *ordinalis*, Latin.) Noting order: as, second, third (*Holder*).

O'rdinal. *s.* (*ordinal*, Fr. *ordinale*, Lat.) A ritual; a book containing orders (*Ainsw.*).

O'RDINANCE. *s.* (*ordonnance*, Fr.) 1. Law; rule; prescript (*Spenser*). 2. Observance commanded (*Taylor*). 3. Appointment (*Shakspeare*). 4. A cannon. It is now generally written for distinction *ordnance* (*Shak.*).

O'RDINARILY. *ad.* (from *ordinary*.) 1. According to established rules; according to settled method (*Woodward*). 2. Commonly; usually (*South*).

O'RDINARY. *a.* (*ordinarius*, Lat.) 1. Established; methodical; regular (*Atterbury*). 2. Common; usual (*Tillotson*). 3. Mean; of low rank (*Addison*). 4. Ugly; not handsome: as, *she is an* ordinary *woman*.

O'rdinary. *s.* 1. Established judge of ecclesiastical causes. 2. Settled establishment (*Bacon*). 3. Actual and constant office (*Wotton*). 4. Regular price of a meal (*Sh.*). 5. A place of eating established at a certain price (*Swift*).

To O'RDINATE. *v. a.* (*ordinatus*, Latin.) To appoint (*Daniel*).

O'rdinate. *a.* (*ordinatus*, Lat.) Regular; methodical (*Ray*.)

Ordinates, in the geometry of curve lines, are right lines drawn parallel to each other, and cutting the curve in a certain number of points.

The parallel ordinates are usually all cut by some other line, which is called the abscis, and commonly the ordinates are perpendicular to the abscissal line. When this line is a diameter of the curve, the property of the ordinates is then the

most remarkable; for in the curves of the first kind, or the conic sections and circle, the ordinates are all bisected by the diameter, making the part on one side of it equal to the part on the other side of it; and in the curves of the 2d order, which may be cut in three points by an ordinate, then of the three parts of the ordinate, lying between these three intersections of the curve and the intersection with the diameter, the part on one side the diameter is equal to both the two parts on the other side of it. And so for curves of any order, whatever the number of intersections may be, the sum of the parts of any ordinate, on one side of the diameter, is equal to the sum of the parts on the other side of it.

The use of ordinates in a curve, and their abscisses, is to define or express the nature of a curve, by means of the general relation or equation between them; and the greatest number of factors, or the dimensions of the highest term, in such equation, is always the same as the order of the line; that equation being a quadratic, or its highest term of two dimensions, in the lines of the second order, being the circle and conic sections; and a cubic equation, or its highest term containing three dimensions, in the lines of the third order; and so on. See Absciss, Coordinate, and Curves.

ORDINATION. *s.* (*ordinatio*, Latin.) 1. Established order or tendency (*Norris*). 2. The act of investing any man with sacerdotal power (*Stillingfleet*).

The form of ordination in the church of England is annexed to the book of Common Prayer, and the authority of it established by 5 and 6 Edw. VI. cap. 1. 8 Eliz. cap. 1. by art. thirty-six of the thirty-nine articles, and by the eighth canon.

The ordination of bishops is more properly called consecration.

Ordination has always been esteemed the principal prerogative of bishops; and they still retain the function as a kind of mark of spiritual sovereignty in their dioceses.

In the ancient discipline there was no such thing as a vague and absolute ordination; but every one was to have a church, whereof he was to be ordained clerk, or priest. In the twelfth century they grew more remiss, and ordained without any title, or benefice.

The council of Trent restored the ancient discipline, and appointed, that none should be ordained but those who were provided of a benefice sufficient to subsist them. The shadow of which practice still obtains among us.

The reformed hold the call of the people the only thing essential to the validity of the ministry; and teach, that ordination is only a ceremony which renders the call more august and authentic.

Accordingly the protestant churches of Scotland, France, Holland, Switzerland, Germany, Poland, Hungary, Denmark, &c. have no episcopal ordination. For Luther, Calvin, Bucer, Melancthon, &c. and all the first reformers and founders of these chuches, who ordained ministers among them, were themselves presbyters, and no other. And though in some of these churches there are ministers called superintendants, or bishops, yet these are only *primi inter pares*, the first among equals; not pretending to any superiority of orders. Having themselves no other orders than what either presbysters gave them, or was given them as presbyters, they can convey no other to those they ordain. On this ground the prostestant dissenters plead, that their ordination, though not episcopal, is the same with that of all the illustrious protestant churches abroad; and object, that a priest ordained by a popish bishop should be received into the church of England, as a valid minister, rightfully ordained; whilst the orders of another, ordained by the most learned, religious presbytery, which any foreign country can boast, are pronounced not valid, and he is required to submit to be ordained afresh.

In opposition to episcopal ordination, they urge, that Timothy was ordained by the laying on of the hands of the presbytery, 1. Tim. iv. 14. that Paul and Barnabas were ordained by certain prophets and teachers in the church of Antioch, and not by any bishop presiding in that city, Acts xiii. 1, 2, 3; and that it is a well known fact, that presbyters, in the church of Alexandria, ordained even their own bishops for more than two hundred years in the earliest ages of christianity. They farther argue, that bishops and presbyters are in scripture the same; and not denominations of distinct orders or offices in the church; referring to Philip. i. 1. Tit. i. 5, 7. Acts xx. 27, 28. and 1 Pet. v. 1, 2. To the same purpose they maintain, that the superiority of bishops to presbyters is not pretended to be of divine but of human institution, not grounded on scripture, but only upon the custom or ordinances of this realm, by the first reformers and founders of the church of England, nor by many of its most learned and eminent doctors since. See Stillingfleet's Irenic. chap. 8. p. 385. in which the learned author affirms and shows this to be the sentiment of Cranmer, and other chief reformers, both in Edw. VI. and queen Elizabeth's reign, of archbishop Whitgift, bishop Bridges, Loe, Hooker, Sutcliffe, Hales, Chillingworth, &c. Moreover, the book entitled the Institution of a Christian Man, subscribed by the clergy in convocation, and confirmed by parliament, owns bishops and presbyters by scripture to be the same. Besides, the protestant dissenters allege, that if episcopal ordination be really necessary to constitute a valid minister, it does not seem to be enjoined by the constitution of the church of England: because the power of ordination which the bishops exercise in this kingdom is derived entirely and only from the civil magistrate; and he authoritatively prescribes how, and to whom ordination is to be given: that if an ordination should be conducted in other manner and form than that prescribed by him, such ordination would be illegal, and of no authority in the church. Accordingly the bishop at the ordination of the candidate asks, "Are you called according to the will of Jesus Christ, and the due order of this realm? The constitution and law of Eng-

land seems to know nothing of uninterrupted lineal descent, but considers the king, vested (by act of parliament or the suffrage of the people) with a fulness of all power ecclesiastical in these realms, as empowering and authorising bishops to ordain: and this power of ordination was once delegated to Cromwell, a layman, as vicegerent to the king. They farther think it strange, that the validity of orders and ministrations should be derived, as some have contended, from a succession of popish bishops; bishops of a church, which, by the definition of the nineteenth article of our church, can be no part of the true visible church of Christ, and bishops, likewise, who consider the protestant clergy, although ordained by protestant bishops, as mere common unconsecrated laymen. They object also to that subscription, which is the term of ordination in the church of England.

The council of Rome in 744, orders, that no ordinations shall be held except on the first, fourth, seventh, and tenth months. With us, by can. 31. ordination-days are the four Sundays immediately following the Ember-weeks; being the second Sunday in Lent, Trinity-Sunday, and the Sundays following the first Wednesday after September the 14th, and December the 13th.

Pope Alexander II. condemns ordination *per saltum*, as they call it; i. e. the leaping to a superior order without passing through the inferior.

Ordination is one of the sacraments of the church of Rome.

ORDNANCE, is a general term for all sorts of great guns, or cannon, mortars, &c. used in war. See CANNON, and GUN.

The strength and serviceableness of a piece of ordnance depends much on the thickness of the metal, especially about its chamber and breech, which is called its fortification.

Of this there are three degrees, both for cannons and culverins. Such are the ordinarily fortified, also called legitimate, pieces. Those whose fortification is lessened, are called bastard pieces. Those doubly fortified, are called extraordinary pieces.

ORDNANCE OFFICE, is the standing grand magazine of arms, habiliments, instruments, and utensils of war, as well by sea as land; not only of those lodged in the Tower, but in all the garrisons, castles, forts, &c. in Great Britain: from whence, as occasion requires, his majesty's armies are supplied. The principal department for ordnance in England is the royal arsenal at Woolwich, most conveniently situated on the right bank of the Thames, with fine quays and every accommodation for the loading and unloading the ordnance store-ships.

The chief officers of ordnance in England are as follows:

Master-general of the ordnance is deemed the principal officer in the civil branch of the ordnance; yet he is always chosen from amongst the first generals in his majesty's service. His trust is very great, as in him is invested the sole power of storing all the military magazines in the king's dominions with proper munitions of war, and likewise to supply the royal navy with what they may need in his department, the parliament granting money in the most liberal manner for this purpose. He is colonel in chief of the royal regiment of artillery, at present consisting of ten battalions; and he is invested with a peculiar jurisdiction over all his majesty's engineers employed in the several fortifications in his majesty's dominions; and to him they are all accountable for their proceedings, and from him they receive their particular orders and instructions, according to the directions and commands given by his majesty in council. As master-general of the ordnance, he has the appointment of almost all the inferior officers and servants. He has a secretary and an under-secretary. There are likewise a secretary to the board of ordnance, and a counsel to the board.

Lieutenant-general of the ordnance receives all orders and warrants signed by the master general, and from the other principal officers, and sees them duly executed, issues orders as the occasions of the state require, and gives directions for discharging the artillery when required at coronations, birth-days, signal victories, and other solemn occasions. It is also his peculiar office to see the train of artillery and all its equipage fitted for motion, when ordered to be drawn into the field, or sent upon any particular service. As lieutenant-general of the ordnance, he is colonel en second of the royal regiment of artillery, and has a secretary and several inferior officers and clerks under him.

Surveyor-general of the ordnance inspects the stores and provisions of war in the custody of the storekeeper, and sees that they are ranged and placed in such order as is most proper for their preservation. He allows all bills of debt, and keeps a check upon all labourers and artificers work; sees that the stores received be good and serviceable, duly proved and marked, as they ought to be, with the king's mark, taking to his assistance the rest of the officers and proof-masters. In order to assist him in the business of his office, he has under him the proof-master of England, and clerks, and other inferior officers.

Clerk of the ordnance, an officer whose function is to record all orders and instructions given for the government of the office; all patents and grants; the names of all officers, clerks, artificers, gunners, labourers, &c. who enjoy those grants, or any other fee for the same; to draw all estimates for provisions and supplies to be made, and all letters, instructions, commissions, deputations, and contracts for his majesty's service; to make all bills of imprest and debentures, for the payment and satisfaction of work done and provisions received in the said office; and all quarter books for the salaries and allowances of all officers, clerks, &c. belonging to the office; and to keep journals and ledgers of the receipts and returns of his majesty's stores, to serve as a check between the two accountants of the office, the one for money, and the other for stores. In

his office he has a number of clerks, under-clerks, and leger-keepers, who have all fixed salaries.

Storekeeper of the ordnance takes into his custody all his majesty's ordnance, munitions and stores belonging thereto, and indents and puts them in legal security after they have been surveyed by the surveyor-general, any part of which he must not deliver without a warrant signed by the proper officers; nor must he receive back any stores formerly issued till they have been reviewed by the surveyor, and registered by the clerk of the ordnance in the book of remains; and he must take care that whatever is under his custody be kept safe, and in such readiness as to be fit for service upon the most peremptory demand. In his office he has several clerks at fixed salaries for the dispatch of business.

Clerk of the deliveries of the ordnance draws all orders for delivery of any stores, and sees them duly executed; charges by indenture the particular receiver of the stores delivered; and, in order to discharge the storekeeper, registers the copies of all warrants for the deliveries, as well as the proportions delivered. He has several clerks in his office at fixed salaries for the dispatch of business.

Treasurer and paymaster of the ordnance receives and pays all monies, both salaries and debentures in and belonging to this office. In his office also are several clerks, ordinary and extraordinary, for the dispatch of business.

Office of ordnance. Besides the principal officers already mentioned, there belongs to this office proof-masters, clerk of the works, a purveyor for the land, and a purveyor for the sea; an architect, an astronomical observer, and other officers. The other part of this office, which is termed the military branch of the ordnance, is a chief engineer, who has under him two directors, four sub-directors, with an unlimited number of engineers in ordinary, engineers extraordinary, sub-engineers, and practitioner engineers.

Ordnance bills, commonly called ordnance debentures, are bills issued by the board of ordnance on the treasurer of that office for the payment of stores, &c. These are not payable at any certain time, and do not bear any interest, so that the discount upon them is often very high; but they are seldom much above two years in arrear.

ORDO. In natural history, an order. A subdivision of a class; or the second branch in a system. This subdivision is usually arbitrary; and is adopted principally, that too many genera may not occur at once to be distinguished. In Linnéus's botanical system the orders of the first thirteen classes are taken from the number of pistils in the flower. In the fourteenth and fifteenth from the pericarp. In the sixteenth, seventeenth, eighteenth, twentieth, twenty-first, and twenty-second, from the number, &c. of stamens. In the nineteenth from the disposition and character of the florets.

ORDONNANCE, in architecture, is the composition of a building, and the disposition of its parts, both with regard to the whole and to one another; or, as Mr. Evelyn expresses it, determining the measure of what is assigned to the several apartments. Thus, ordonnance is the judicious contrivance of the plan or mould; as when the court, hall, lodgings, &c. are neither too large nor too small, but the court affords convenient light to the apartments about it; the hall is of fit capacity to receive company; and the bed-chamber, &c. of a proper size. When these divisions are either too great or too small, with respect to the whole, as where there is a large court to a little house, or a small hall to a magnificent palace, the fault is in the ordonnance. See ARCHITECTURE.

ORDONNANCE, in painting, is used for the disposition of the parts of a picture, either with regard to the whole piece, or to the several parts, as the groups, masses, contrasts, &c. See PAINTING.

ORDURE. *s.* (*ordure,* French.) Dung, filth. (*Shakspeare*).

OREADES, nymphs of the mountains, daughters of Phoroneus and Hecate. Some call them Orestiades, and give them Jupiter for father. They generally attended upon Diana, and accompanied her in hunting.

ORELLANA (Francis), a Spaniard, with Pizarro in the conquest of Peru. He deserted his companions, and penetrating into the country, was the first European who saw the Amazon, the best part of whose course he observed, till he reached the Spanish settlements of Cubagna, from which he departed for Europe. In the relation of what he had seen, he united the marvellous and the true, and by reporting that he had passed through a country peopled by Amazons, he gave that name to the great river which he had discovered. He perished in endeavouring again to discover the mouth of it, about 1550.

OREOSELINUM. (*oreoselinum,* ορεοσελινον, from ορος, a mountain, and σελινον, parsley, so named because it grows wild upon mountains). Black mountain parsley. The root and seed of this plant, athaminta oreoselinum; foliolis divaricatis of Linnéus, as well as the whole herb, were formerly used medicinally. Though formerly in so high estimation as to obtain the epithet of polychesta, this plant is seldom used in the practice of the present day. An extract and tincture prepared from the root were said to be attenuant, aperient, deobstruent, and lithontriptic. The oil obtained by distillation from the seed was esteemed to allay the toothach; and the whole was recommended as an antiscorbutic and corroborant.

ORES, in mineralogy, mineral bodies composed either entirely of metals, or of which metals constitute the most considerable and important part. It is from the minerals belonging to this class that all metals are extracted.

When metals are exposed to the action of heat and air most of them lose their lustre, and are gradually converted into earthy-like powders of different colours and properties, according to the

metal and the different degrees of heat employed. Several of them even take fire when exposed to a strong heat; and after combustion the residuum is found to be the very same earthy-like substance.

The metals that have been hitherto assayed upon any considerable scale (for we omit the consideration of the alkaline metals and those of which the earths are supposed to be oxyds) amount to twenty-eight; whence metallic ores may be divided into twenty-three orders.

Metals exist in the ores in one or the other of the four following states. 1. In a metallic state, and either solitary or combined with each other; in the last case forming alloys. 2. Combined with sulphur, forming sulphurets. 3. Combined with oxygen, forming oxyds. 4. Combined with acids, forming carbonats, phosphats, &c. which generally pass under the name of metallic salts.

Each order therefore may be divided into the four following genera:

Alloys	Oxyds
Sulphurets	Salts.

It must be observed, however, that every metal has not hitherto been found in all these four states, and some of them are hardly susceptible of them all. Several of the orders, therefore, want one or more genera, as will be seen from Dr. Thomson's valuable table; which, however, extends to not more than twenty-five, three of the twenty-eight having hitherto only been found in the ores of platinum. The table runs as follows:

Order I.—*Gold*.
1. Alloys.

Order II.—*Platinum*.
1. Alloys.

Order III.—*Iridium*.
1. Alloys.

Order IV.—*Silver*.
1. Alloys.
2. Sulphurets.
3. Salts.

Order V.—*Mercury*.
1. Alloys.
2. Sulphurets.
3. Salts.

Order VI.—*Copper*.
1. Alloys.
2. Sulphurets.
3. Oxyds.
4. Salts.

Order VII.—*Iron*.
1. Alloys.
2. Sulphurets.
3. Oxyds.
4. Salts.

Order VIII.—*Nickel*.
1. Alloys.
2. Oxyds.

Order IX.—*Tin*.
1. Sulphurets.
2. Oxyds.

Order X.—*Lead*.
1. Sulphurets.
2. Oxyds.
3. Salts.

Order XI.—*Zinc*.
1. Sulphurets.
2. Oxyds.
3. Salts.

Order XII.—*Bismuth*.
1. Alloys.
2. Sulphurets.
3. Oxyds.

Order XIII.—*Antimony*.
1. Alloys.
2. Sulphurets.
3. Oxyds.
4. Salts.

Order XIV.—*Tellurium*.
1. Alloys.

Order XV.—*Arsenic*.
1. Alloys.
2. Sulphurets.
3. Oxyds.
4. Salts.

Order XVI.—*Cobalt*.
1. Alloys.
2. Oxyds.
3. Salts.

Order XVII.—*Manganese*.
1. Oxyds.
2. Salts.

Order XVIII.—*Chromium*.
1. Alloys.
2. Oxyds.
3. Salts.

Order XIX.—*Uranium*.
1. Oxyds.

Order XX.—*Molybdenum*.
1. Sulphurets.

Order XXI.—*Tungsten*.
1. Salts.

Order XXII.—*Titanium*.
1. Oxyds.

Order XXIII.—*Columbium*.
1. Oxyds.

Order XXIV.—*Tantalum*.
1. Oxyds.

Order XXV.—*Cerium*.
1. Oxyds.

In the analysis of ores it is impossible to lay down any general rule, so numerous are the ores themselves, and so diversified the means necessary to be pursued in the different analytic processes. We shall however offer a few remarks upon the ores of most consequence; and for other general observations upon the same subject, which may be usefully connected with the present, we refer our readers to the article MINERALOGY.

The ores of metals may be analyzed in two modes, in the humid, and the dry way. The first is effected with the aid of acids, and of other liquid agents, and may often be accomplished by very simple means, and without the aid of a bulky

and expensive apparatus. If sulphur be present, it impedes the action of acids, and should be separated by roasting the ore on a muffle, or by projecting it mixed with twice its weight of nitre into a red-hot crucible, washing off the alkali afterwards with hot water. No solvent will act upon all the metals. Thus nitric acid does not act on gold and platina; and the nitro-muriatic acid, which dissolves these metals, has no solvent action on silver. Hence the necessity of varying the solvent according to the nature of the ore under examination. We shall give a few instances by which the reader will understand the theory, and may be enabled to verify the facts by practice.

For *ores of gold and platina*, the nitro-muriatic acid is the most proper solvent. A given weight of the ore may be digested with this acid as long as it extracts any thing. The solution is to be evaporated to dryness, in order to expel the excess of acid, and dissolved in water. The addition of a solution of tin and muriatic acid will show the presence of gold by a purple precipitate; and platina will be indicated by a precipitate, on adding a solution of muriate of ammonia. When gold and platina are both contained in the same solution, they may be separated from each other by the last-mentioned solution, which throws down the platina, but not the gold. In this way platina may be detached also from other metals.

For extracting *silver* from its ores, the nitric acid is the most proper solvent. The silver may be precipitated from nitric acid by muriate of soda. Every hundred parts of the precipitate contains seventy-five of silver. But, as lead may be present in the solution, and this metal is also precipitated by muriate of soda, it may be proper to immerse in the solution a polished plate of copper. This will precipitate the silver, if present, in a metallic form. The muriate of silver is also soluble in liquid ammonia, which that of lead is not.

Copper ores may be analyzed by boiling them with five times their weight of concentrated sulphuric acid, till a dry mass is obtained, from which water will extract the sulphate of copper. This salt is to be decomposed by a polished plate of iron, immersed in a dilute solution of it. The copper will be precipitated in a metallic state, and may be scraped off and weighed. If silver be suspected with copper, nitrous acid must be employed as the solvent; and a plate of polished copper will detect the silver.

Iron ores may be dissolved in dilute muriatic acid, or, if the metal be too highly oxydized to be dissolved by this acid, they must be previously mixed with one-eighth of their weight of powdered charcoal, and calcined in a crucible for an hour. The iron is thus rendered soluble. The solution must then be diluted with ten or twelve times its quantity of water, previously well boiled, to expel the air, and must be preserved in a well-stopped glass bottle for six or eight days. The phosphate of iron will within that time be precipitated, if any be present, and the liquor must be decanted off. The solution may contain the oxyds of iron, manganese, and zinc. It may be precipitated by carbonate of soda, which will separate them all. The oxyd of zinc will be taken up by a solution of pure ammonia; distilled vinegar will take up the manganese, and will leave the oxyd of iron. From the weight of this, after ignition, during a quarter of an hour, twenty-eight per cent. may be deducted.

Tin ores.—Boil 100 grains, in a silver vessel, with a solution of 600 grains of pure potash. Evaporate to dryness, and then ignite moderately for half an hour. Add boiling water, and if any portion remain undissolved let it undergo a similar treatment. Saturate the alkaline solution with muriatic acid, which will throw down an oxyd of tin. Let this be redissolved by an excess of muriatic acid: again precipitated by carbonate of soda; and being dried and weighed, let it, after lixiviation, be once more dissolved in muriatic acid. The insoluble part consists of silix. Into the colourless solution, diluted with two or three parts of water, put a stick of zinc, round which the reduced tin will collect. Scrape off the deposit, wash, dry, and fuse it under a cover of tallow in a capsule placed on charcoal. A button of pure metallic tin will remain at the bottom, the weight of which, deducted from that of the ore, indicates the proportion of oxygen. The presence of tin in an ore is indicated by a purple precipitate, on mixing its solution in muriatic acid with one of gold in nitro-muriatic acid.

Lead ores may be analyzed by solution in nitric acid, diluted with an equal weight of water. The sulphur, if any, will remain undissolved. Let the solution be precipitated by carbonate of soda. If any silver be present, it will be taken up by pure liquid ammonia. Wash off the excess of ammonia by distilled water; and add concentrated sulphuric acid, applying heat, so that the muriatic acid may be wholly expelled.

Mercury may be detected in ores that are supposed to contain it, by distillation in an earthen retort with half their weight of iron filings or lime. The mercury, if any be present, will rise and be condensed in the receiver.

Ores of zinc may be digested with the nitric acid, and the part that is dissolved boiled to dryness, again dissolved in the acid, and again evaporated. By this means the iron, if any be present, will be rendered insoluble in dilute nitric acid, which will take up the oxyd of zinc. To this solution add pure liquid ammonia, in excess, which will separate the lead and iron, if any should have been dissolved; and the excess of alkali will retain the oxyd of zinc. This may be separated by the addition of an acid.

Antimonial ores.—Dissolve a given weight in three or four parts of muriatic, and one of nitric acid. This will take up the antimony, and leave the sulphur, if any. On dilution with water the oxyd of antimony is precipitated, and the iron and mercury remain dissolved. Lead may be detected by sulphuric acid.

Ores of cobalt may be dissolved in nitro-muriatic acid. Then add carbonate of potash, which, at first, separates iron and arsenic. Filter, and add a further quantity of the carbonate, when a greyish-red precipitate will fall down, which is oxyd of cobalt. The iron and arsenic may be separated by heat, which volatilizes the arsenic. Cobalt is also ascertained, if the solution of an ore in muriatic acid give a sympathetic ink. See Klaproth's Essays.

To analyze ores in the dry way, a method which affords the most satisfactory evidence of their composition, and should always precede the working of large and extensive strata, a more complicated apparatus is required. An assaying furnace, with muffles, crucibles, &c. are absolutely necessary.

The reduction of an ore requires frequently previous roasting, to expel the sulphur and other volatile ingredients; or this may be effected by mixing the powdered ore with nitre, and projecting the mixture into a crucible. The sulphate of potash, thus formed, may be washed off, and the oxyd

must be reserved for subsequent experiments. As many of the metals retain their oxygen so forcibly that the application of heat is incapable of expelling it, the addition of inflammable matter becomes expedient. And, to enable the reduced particles of metal to agglutinate and form a collected mass, instead of scattered grains, which would otherwise happen, some fusible ingredient must be added, through which, when in fusion, the reduced metal may descend, and be collected at the bottom of the crucible. Substances that answer both these purposes are called fluxes. The alkaline and earthy part of fluxes serve also another end; viz. that of combining with any acid which may be attached to a metal, and which would prevent its reduction, if not separated. The ores of different metals, and different ores of the same metal, require different fluxes. (See FLUX.) The ore, after being roasted, if necessary, is to be well mixed with three or four times its weight of the flux, and put into a crucible, with a little powdered charcoal over the surface. A cover must be luted on, and the crucible exposed to the necessary heat in a wind-furnace. Ores of iron, as being difficultly reduced, require a very intense fire. Those of silver and lead are metallized by a lower heat. The metal is found at the bottom of the crucible, in the form of a round button. The volatile metals, as mercury, zinc, arsenic, tellurium, and osmium, it is obvious, ought not to be treated in the above manner, and require to be distilled with inflammable matters in an earthen retort. See Kirwan's Mineralogy.

ORESTÆ, a people of Epirus. They received their names from Orestes, who fled to Epirus when cured of his insanity. (*Lucan.*)

ORESTES, a son of Agamemnon and Clytemnestra. When his father was murdered by Clytemnestra and Ægisthus he was saved by his sister Electra, called Laodicea by Homer, and was privately conveyed to the house of Strophius, king of Phocis. He was tenderly treated by Strophius, who carefully educated him with his son Pylades. From their familiarity between the two young princes soon arose the most inviolable friendship. When Orestes arrived to years of manhood he visited Mycenæ, and avenged his father's death by assassinating his mother Clytemnestra and her adulterer Ægisthus. The manner in which he committed this murder is variously reported, but the people immediately after acknowledged him as king. In consequence of the parricide, Orestes is represented as tormented by the Furies, and exiles himself to Argus, where he is still pursued by the avengeful goddesses. Apollo himself purifies him, and he is acquitted by the unanimous opinion of the Areopagites. Euripedes says, that Orestes, after the murder of his mother, consulted the oracle of Apollo at Delphi, where he was informed that nothing could deliver him from the persecutions of the Furies if he did not bring into Greece Diana's statue, which was in the Taurica Chersonesus, and which, as it is reported, had fallen from heaven. This was an arduous enterprize. The king of the Chersonesus always sacrificed all such as entered the borders of his country. Orestes and his friend were both carried before Thoas, the king of the place, and doomed to be sacrificed Iphigenia, then priestess of Diana, was to immolate these strangers. The intelligence that they were Grecians delayed the preparations, and Iphigenia was anxious to learn something about her country which had given her birth. (See IPHIGENIA.) She offered to spare the life of one of them, provided he would convey letters to Greece from her hand. This was a difficult trial; never was friendship more truly displayed, but at last Pylades gave way to the pressing entreaties of his friend, and consented to carry the letters of Iphigenia to Greece. These were addressed to Orestes himself, and, therefore, these circumstances soon led to a discovery of the connections of the priestess with Orestes. Iphigenia, convinced that he was her brother Orestes, resolved, with the two friends, to fly from Chersonesus, and to carry away the statue of Diana. Their flight was discovered, and Thoas prepared to pursue them, but Minerva interfered, and told him, that all had been done by the will and approbation of the gods. After these celebrated adventures Orestes ascended the throne of Argos, where he reigned in perfect security, and married Hermione, the daughter of Menelaus, and gave his sister to his friend Pylades. The marriage of Orestes with Hermione is, however, a matter of dispute among the ancients. His old age was crowned with peace, and security, and he died in Arcadia, in the 90th year of his age, leaving his throne to his son Tisamenes, by Hermione. The friendship of Orestes and of Pylades became proverbial.

ORESTEUM, a town of Arcadia, about 18 miles from Sparta. It was founded by Orestheus, a son of Lycaon, and originally called Oresthasium, and afterwards Oresteum, from Orestes, the son of Agamemnon, who came there.

ORESTIDÆ, the descendants or subjects of Orestes, the son of Agamemnon. They were driven from the Peloponnesus by the Heraclidæ.

OREXIS. (from ὀρέγομαι, to labour.) In medicine, the appetite: the sense of hunger.

ORFA, a considerable town of Turkey in Asia, in Diarbeck, which formerly belonged to Persia. It has a good trade, particularly in carpets of several sorts, some of which are made here. It has a stately castle on a hill, and is seated on the Euphrates, 83 miles N.E. of Aleppo, and 100 S.W. of Diarbekar. Lon. 38. 20 E. Lat. 36. 50 N.

ORFORD, a seaport and borough in Suffolk, with a market on Monday. It is said to have had twelve churches, but has now only one, whose steeple is a sea-mark; and near it are the ruins of an old castle, a priory, and St. George's chapel. It is governed by a mayor, sends two members to parliament, and is seated on the German Ocean, between two channels, 18 miles E. by N. of Ipswich, and 88 N.E. of London. Lon. 1. 40 E. Lat. 52. 11 N.

ORFORD NESS, a cape of England, on the S.E. coast of Sussex, where a lighthouse is

erected for the direction of ships. Lon. 1. 6 E. Lat. 52. 4 N.

ORGAL, among dyers, lees of wine dried.

ORGAN, a wind instrument blown by bellows, and containing numerous pipes of various kinds and dimensions, and of multifarious tones and powers. Of all musical instruments this is the most proper for the sacred purpose to which it is most generally applied in all countries wherever it has been introduced. Its structure is lofty, elegant, and majestic, and its solemnity, grandeur, and rich volume of tone, have justly obtained it an acknowledged pre-eminence over every other instrument.

An organ, when complete, is of three-fold construction, and furnished with three sets of keys: one for what is called the great organ, and which is the middle set; a second (or lower set) for the choir organ; and a third (or upper set) for the swell. In the great organ, the principal stops are the two diapasons, the principal, the twelfth, the fifteenth, the sesquialtra, the mixture or furniture, the trumpet, the clarion, and the cornet. The choir organ usually contains the stopt diapason, the dulciana, the principal, the flute, the twelfth, the bassoon, and the vox humane. The swell comprises the two diapasons, the principal, the hautboy, trumpet, and cornet. Besides the complete organ, there are other organs of lesser sizes, and more limited powers, adapted to church, chapel, and chamber use. There is also the barrel or hand-organ, consisting of a moveable, turning cylinder called a barrel, on which, by means of wires, pins, and staples, are set the tunes it is intended to perform. These pins and staples, by the revolution of the barrel, act upon the keys within, and give admission to the wind from the bellows to the pipes. The barrel-organ is generally portable, and so contrived that the same action of the hand which turns the barrel, supplies the wind by giving motion to the bellows.

The invention of the organ, which is attributed to the Greeks, is very ancient, though it is generally allowed to have been little used before the eighteenth century.

It has been a subject of debate at what time the use of organs was first introduced into the church. Some writers say, that they were first applied to sacred use in the time of pope Vitalian, about the year 660, others that they were not employed in that way till the ninth century. A learned author has, however, shown that neither of these dates can be just: and Thomas Aquinas expressly says, that in his time (about the year 1250) the church did not use musical instruments; and Bingham says, that Marinus Sauntus, who lived about the year 1290, first introduced the use of them into churches. But if we may give credit to the testimony of Gervas, the monk of Canterbury, who flourished at the beginning of the thirteenth century, organs were introduced more than one hundred years before his time. Bede, who died in 735, says nothing of the use of organs, or other musical instruments in our churches or convents, though he minutely describes the manner in which the psalms and hymns were sung; yet Mabillon and Muratori inform us, that organs, during the tenth century, became common in Italy and Germany, as well as in England; and that about the same time they had admission into the convents throughout Europe.

The organs in Germany (says Dr. Burney), in magnitude, and the organists in abilities, seem unrivalled in any other part of Europe, particularly in the use of pedals. In Marpurg's Essays, vol. iii. there is a minute account of a variety of organs in Germany; of all which the longest pipe of the manuals is 16 feet long, and of the pedals 32. One of the largest organs in Germany, but which Marpurg has omitted in his list, is at Gorliz in Upper Lusatia.

Among the modern improvements of the organ, the most remarkable are the swell and the tremblant: the former, invented by an English artist, consists in a number of pipes placed in a remote part of the instrument, and inclosed in a kind of box, which, being gradually opened by the pressure of the foot, increases the sound as the wind does the sound of a peal of bells, or suppresses it in like manner by the contrary action. The tremblant is a contrivance by means of a valve in the portvent or passage from the wind-chest, to check the wind, and admit it only by starts; so that the notes seem to stammer, and the whole instrument to sob, in a manner very offensive to the ear. There is a tremblant in the organ at the German chapel in the Savoy. See Hawkins's History of Music, and Burney.

ORGAN (Hydraulic), denotes a musical machine that plays by water instead of wind. Of these there are several in Italy, in the grottos of vineyards. Ctesebes of Alexandria, who lived in the time of Ptolemy Euergetes, is said to have invented organs that played by compressing the air with water, as is still practised. Archimedes and Vitruvius have left us descriptions of the hydraulic organ. In the cabinet of queen Christina is a beautiful and large medallion of Valentinian, on the reverse whereof is seen one of these hydraulic organs; with two men, one on the right, the other on the left, seeming to pump the water which plays it, and to listen to its sound. It has only eight pipes, placed on a round pedestal. The inscription is PLACEA SPETRI, if it be not wrong copied, which we suspect to be the case.

Construction of the Organ.—This may be understood by the following description of one made by Messrs. Flight and Co. St. Martin's Lane, London, and which, besides many other improvements, is so contrived as to serve both for a finger-keyed organ, and a barrel organ.

Plates 125 and 126 exhibit this instrument in different positions, the same letters of reference being employed in both figures. The instrument is represented as having all parts of the ornamental case removed, to explain the

interior mechanism. The instrument is included within a frame composed of four vertical posts AA, in both plates, connected by a horizontal frame B at top, and C at bottom. The latter has a board fitted into it, as is shown in the figures, which is the middle board of the bellows; of these there are three pair, each acting double; they are all three shown in plate 126 at D, E and F, and a section of one pair is seen in plate 125. The middle bellows D, which are much larger than the other two, are intended to be worked by the foot of the performer, by means of a treadle which comes out in the front of the instrument under the key board: the others EF are intended, one to be worked by the same handle which works the barrel, when it is to be used as a barrel-organ, and the third pair are to be moved by the hand of an assistant, in the usual manner of church organs. The bellows consist of a board *ab*, fig. 1. having valves in it, shutting downwards: it is connected by leathers all round its edge with the middle board, which has also valves in it shutting downward. The chamber thus formed between the two boards is divided into two by a vertical partition (above *d*) extending from one board to the other: the board *ab* is jointed to this partition at the point *d*, and when worked vibrates on this joint as a center, enlarging one chamber and diminishing the other; which operation, by the arrangement of the valves, throws a constant stream of air into the regulator G of the bellows. Suppose the end *a* of the board ascending, and the other *b* descending; then the valves in *b* will be open to take in a supply of air to their chamber. The valves in *a* will be shut, and the air included in that chamber is forced up through the valves in the middle board, into the regulator, which consists of a large board G joined by leathers on all sides to the middle board, forming a great chamber to contain the air supplied by the bellows; and the weight of the board G always resting upon the included air, affords a constant supply to the organ during any intermission of the action of the bellows. The air passes off from the regulator by a wooden pipe H, fig. 4, called the wind trunk, and is by this conducted to a large shallow box at KK, called the wind chest, which is immediately beneath the assemblage of pipes LL. In the upper side of this chest are several valves *f* and *g*, fig. 1, which are kept shut by a small wire spring applied to each; when any of the valves are opened (by drawing down a wire *h* fastened to each, and coming through a small hole in the bottom of the wind chest), the air passes out of the wind chest into a horizontal groove which is seen just over the valves *f* and *g*, fig. 1, and ascends through vertical passages into any of the pipes LL, causing them to sound. The wires *h* are hooked to the valves at their upper ends, and at the lower are jointed to levers *r*, which have their centers fixed in the beam R: at the opposite end of these, small rods *s* are jointed, which at the lower ends rest upon the extreme ends of the finger keys *tv*: by this arrangement, when the end *v* of any key is pressed down it raises the rod *s*; this draws down the wire *h*, and opens the valve, causing the pipe belonging to that key to emit a sound. The finger keys as shown in fig. 4 (at *vv*) are much nearer together than the wires *h*. To manage this the levers *r* are not placed parallel, but diverging from each other so that the ends *s* are close together; but the opposite ends are a considerable distance asunder. The keys *tv* are fitted in a frame which slides in a groove Z of the framing; by this means the keys can be pushed back out of the way when the organ is not in use. Any of the passages which conduct the air from the valves to the pipes can be stopped or opened at pleasure by sliders called stops: these are shown at *h*, *i* and *k*, fig. 4: they are narrow rulers of mahogany, sliding in passages which they exactly fill, and through which all the vertical passages to the pipes are conducted. The stops have holes through them answering to these passages, and when these holes are over the passages, they are open to allow the air to pass through; but by drawing the slider endways a small distance, the spaces between the holes in the stop apply themselves over the passages and shut them all up at once. Each stop opens passages to a complete set of pipes, consisting of one answering to each of the notes of the finger keys: these pipes are gradually diminished in size and length from the largest base note to the smallest treble, as is shown in fig. 4. at LL; but this row contains only about half the number of pipes corresponding with the finger keys, and the remaining numbers are placed in another row for want of room; and the upper board *mm* on which the pipes are placed, has horizontal passages cut in it to conduct the air from any valve to its respective pipe, when the same is not situated exactly over it. This organ is provided with five stops or sets of pipes, that is, five to each key, any one or all of which can be made to speak. The largest, MM, fig. 1, is a set of wooden pipes arranged in two rows; it is called the stop diapason. The next, N, is called the open diapason, from being metallic pipes open at the upper ends; O is the principal stop with metallic pipes, so called because it is that which is most generally used in the music adapted for organs; indeed it is almost always in use, the others being used as accompaniments to it. P is called the 12th stop, and Q the fifteenth; the latter being chiefly small pipes, can be contained in a single row. Each stop or system of pipes is provided with three sliders, one beneath the other, as shown at *h*, *i*, *k*, fig. 4: and by drawing either of these three, the same effect will be produced on the organ, viz. shutting off or opening the stop of pipes to which they belong. The sliders are drawn by levers at the end of them; the levers for the lower slides *k* are shown in fig. 2, plate 125; being fixed on the upper ends of spindles *nnn*, also seen in fig. 4. To the lower ends of these spindles, long levers, *o*, fig. 4, are fixed; and at the end of these small rods are jointed, which come through the case

of the instrument close to the finger keys, and have handles fixed upon them. These are marked with the names of the stop of pipes they belong to, and any one being thrust in moves the slider and opens the stop of pipes, which will then be sounded by pressing the finger keys. The middle sliders are drawn by levers, as shown in fig. 3, at *p*, and also in fig. 4: from the arm of this lever a wire *g* proceeds to connect it with a pedal, by which the slider is moved. These pedals are used in quick music to change the pipes upon which the keys operate by drawing another slider. The upper sliders are drawn by levers adapted to the purpose which are moved by pins in the barrel, when the organ is used in that manner. The barrel is shown at T in fig. 125: it is a wooden cylinder with a number of pins projecting from its surface: these, as it revolves, catch the ends of short levers *w*, the other ends of which have wire going to a set of valves *g* exactly similar to the others, and opening into the same passages. The barrel has a wheel upon one end of it, with teeth which are engaged by the worm of an endless screw, upon the end of which is a handle to turn it round, and also a crank, which gives motion to the bellows. The barrel is furnished with a number of short pins, disposed in such intervals upon its surface as to lift the different valves in the succession required for the tune it is intended to perform. The barrel is longer than the set of levers *w* which it applies to, by the space between two levers; and the barrel can be moved endways that quantity. Now by moving it a portion of this distance, an entire new set of pins is brought into action upon the levers *w*, and this set of pins serves for another tune.

After the minute description we have given of the parts, it is needless to say much of their mode of action. The bellows are constantly worked either by the hand or foot, and continually blow into the regulator G. If more air is pumped in here than passes out at the wind trunk, the top G rises; but when it gets to the height which is intended, a string fastened to the top raises up a valve in the middle board, and suffers the air to escape by returning into the bellows: by this means the regulator can never be in danger of bursting. A string *x* is fastened to the top of the regulator, and passes over a small pulley *y* fixed on the end of a small spindle which comes through the front of the instrument, and has a hand or index pointing to marks upon a small dial plate, indicating the height to which the top has risen, and consequently the quantity of air; in this state of the instrument, by pressing any finger key, a valve is opened, and air admitted into any pipe according to the stops which are out.

The organ pipes are of two kinds; those shown at M, which are square wooden trunks with a small pipe at bottom, bringing the air to them, this air passes out at a very narrow crevice, marked 1 in M, and the current of air is split as it issues by the edge of one side of the trunk, which is cut to a sharp edge for that purpose. The vibration of the air contained in the trunk causes the sound; at the top of the trunk a plug is fitted, and by sliding this up or down, the pipe is adjusted to the note it is intended to sound.

The other kind of pipes are on the same principle, but formed of metal instead of wood, and are tuned by pinching up or battering out the top of the pipe, so as to enlarge or diminish the aperture of the upper end; if much alteration is required, a small piece is cut off of the upper end.

Organ denotes also any natural instrument, as the tongue is the organ of speech.

O'RGANARII, ancient organists who performed on the hydraulic organ. Said to have been so called from the word *organum*, applied to a certain part of that instrument.

ORGAN-BELLOWS. A well-known pneumatic machine attached to an organ, and the office of which is to supply the pipes with wind. The general fault in the bellows of organs is their want of capacity, which renders it laborious to the blower to keep the chest full, and renders the instrument liable to continual exhaustion when performed on in full chords.

ORGAN-BUILDER. An artist whose profession it is to construct, and to tune and repair organs. An organ-builder, besides possessing a nice, accurate, and cultivated ear, and a sound judgment in the vibratory qualities of wood and metal, ought to be acquainted with pneumatics, generally versed in practical mechanics, and so far informed in plain counterpoint and the simple elements of musical composition, as, in some degree, to be capable of trying the different stops and combinations of his own instruments, and of deciding for himself on their effects in performance.

ORGA'NICAL. Orga'nic. *a.* (*organique*, French; *organicus*, Latin.) 1. Consisting of various parts co-operating with each other (*Milton*). 2. Instrumental; acting as instruments of nature or art, to a certain end (*Milt.*). 3. Respecting organs (*Holder*).

ORGA'NICALLY. *ad.* (from *organical.*) By means of organs or instruments (*Locke*).

ORGA'NICALNESS. *s.* (from *organical.*) State of being organical

O'RGANISM. *s.* (from *organ.*) Organical structure (*Grew*).

ORGANIST, a term which may, in strictness of speech, be applied to any masterly performer on the organ; but in its common acceptation signifies a professor of music who holds the office of organist to some cathedral, parochial church, or chapel, or is the deputy of a person so appointed.

ORGANISTS. The old name applied to those Romish priests who organized, or sung in parts.

Organists of the Hallelujah. An appellation given about the year 1200 to certain priests or clerks, who assisted in the performance of the mass. There were generally four of them. They sung in parts, i. e. they

organized the melody; particularly that applied to the word Hallelujah, by adding to it other parts, and thence were called Organists of the Hallelujah.

ORGANIZATION. *s.* (from *organize.*) Construction in which the parts are so disposed as to be subservient to each other (*Locke*).

To O'RGANIZE. *v. a.* (*organiser*, Fr.) To construct so as that one part co-operates with another; to form organically (*Hooker*).

ORGANIZED PIANO-FORTE. An instrument of modern invention, consisting of an organ and piano-forte, so conjoined that the same set of keys serve for both; or for either singly, at the pleasure of the performer.

ORGAN-KEYS, those moveable, projecting levers, in the front of an organ, placed and fitted to receive the fingers of the performer; and which, by a connected movement with the valves, or pallets, admit or exclude the wind from the pipes. When a single key of an organ is pressed down, all those pipes are heard which are permitted by that key, and the stops, then out, to receive the wind.

ORGAN-MUSIC. Concertos, voluntaries, preludes, services, anthems, chants, psalms, hymns, and whatever is either expressly composed for the organ, or the performance of which requires the accompaniment of that instrument.

ORGAN-PIPES. The square and cylindrical tubes in an organ, from which proceed the various sounds of that noble and complicated instrument. The square pipes are always made of wood, the round ones of metal, consisting of a compound of lead, and grain tin.

ORGAN-STOP. An expression applied to any collection of pipes coming under one general name: as when we say, the dulciana stop is sweet, the trumpet stop is powerful, &c.

O'RGANLOFT. *s.* (*organ* and *loft.*) The loft where the organ stands (*Tatler*).

ORGANO. (Ital.) Organ. The word organo is found at the beginning of that stave in the score of oratorio chorusses, instrumental anthems, &c. designed for the organ, and the execution of the thorough-bass.

ORGANO PICCIOLO: (Ital.) A small, or chamber-organ. See ORGAN.

ORGANORUM INTABULATURÆ. The general name formerly given to voluntaries, preludes, and all compositions for the organ.

ORGANUM. The art of descant, or double singing. An old mode of singing in two parts, generally in thirds, and first suggested by the organ, from the facility that instrument affords of sounding two or more notes at once. This word was also applied by the ancients to a brazen vessel which formed a principal part in the hydraulic organ, out of which the air, pressed by the incumbent water, was forced into the tibiæ, or pipes.

ORGANZINE, in commerce, a description of silk usually imported from Italy into this country. It is of the utmost importance to the manufacturer, as none of the principal articles could be fabricated without it; and the Italians, aware of this, long kept the art of throwing it a most profound secret. It was introduced into this country by the enterprise and skill of Messrs. Thomas and John Lombe, the latter having at the risk of his life, and with wonderful ingenuity, taken a plan of one of these complicated machines, in the king of Sardinia's dominions, from which, on his return, they established a similar set of mills in the town of Derby; and in consideration of the great hazard and expense attending the undertaking, a patent was granted to sir Thomas Lombe, in 1718, for securing to him the exclusive privilege of working organzine for the term of 14 years; but the construction of buildings and engines, and the instruction of the workmen, took up so much time, that the 14 years were nearly expired before he could derive any advantage from it, in consequence of which he petitioned parliament, in 1731, to grant him a further term; but parliament considering it an object of national importance, granted him the sum of 14,000*l.* on condition that he should allow a perfect model of the machinery to be taken, and deposited in the Tower of London for public inspection. Similar mills were, in consequence, set up in different parts of the country; but owing to the difficulties that were experienced in procuring raw silk of the proper size for organzine, the exportation of which from Italy was prohibited, and to the mills having subsequently found employment for other purposes, the quantities worked into organzine, for many years, bore scarcely any proportion to the imports from Italy; it has, however, been since revived and improved, in consequence of which it is now carried to a very considerable extent.

The process which the silk undergoes to bring it into this state, consists of six different operations: 1. The silk is wound from the skein upon bobbins. 2. It is then sorted. 3. It is spun, or twisted, on a mill in the single thread. 4. Two threads thus spun are doubled or drawn together through the fingers of a woman, who at the same time cleans them by taking out the slubs which may have been left in the silk by the negligence of the foreign reeler. 5. It is then thrown by a mill, that is, the two threads are twisted together either slack or hard, as the manufacture may require; and it is wound at the same time in skeins upon a reel. 6. The skeins are sorted according to their different degrees of fineness, and then the process is complete.

Organzine was for many years made only from Italian silk, but when considerable improvements were made in the culture of silk in India, it suggested the possibily of throwing some of the finer silks of Bengal into organzine. The experiments of individuals were not very satisfactory, but in the beginning of 1794, the East India Company took up the subject with the view of increasing the annual consumption of Bengal silk in this country; and having it in

their power to select from their total import the silks most proper for this purpose, they have been enabled, at each subsequent sale, to put up from 80 to 100 bales of good Bengal organzine. It has been adopted successively in several branches of the manufacture; and in the year 1808, when the prohibition of exportation from Italy produced a scarcity of the silks of that country, attempts were made to substitute Bengal organzine for all the purposes to which Italian organzine was applied; the result, however, appeared to be that, for some particular articles, Italian organzine possesses peculiar properties not to be found in any other kind of silk.

ORGASM (ὀργασμὸς), an impetus, or quick motion of the blood or spirits, whereby the muscles are convulsed, or move with uncommon force, from what cause soever it proceeds; though, by ὀργάω, the ancients generally understood an ungovernable desire of coition, when the seminal vessels were so turgid, as not to contain their contents from involuntary emission.

ORGAZ, a town of Spain, in New Castile, with a castle, 15 miles S. of Toledo. Lon. 3. 22 W. Lat. 39. 36 N.

ORGELET, a town of France, in the department of Jura, seated at the source of the Valouse, 30 miles N. by E. of Bourg. Lon. 5. 39 E. Lat. 46. 36 N.

ORGIA, festivals in honour of Bacchus. They are the same as the Bacchanalia, Dionysia, &c. which were celebrated by the ancients to commemorate the triumph of Bacchus in India. See DIONYSIA.

ORGI'LLOUS. *a.* (*orgueilleux*, French.) Proud; haughty: not in use (*Shakspeare*).

ORGIVA, a town of Spain, in the province of Granada, 25 miles S. of Granada. Lon. 3. 50 W. Lat. 36. 43 N.

ORGUES, in the military art, are thick long pieces of wood, pointed at one end, and shod with iron clear one of another; hanging each by a particular rope or cord, over the gateway of a strong place, perpendicularly, to be let fall in case of the approach of an enemy. Orgues are preferable to herses or portcullices, because these may be either broke by a petard, or they may be stopped in their falling down: but a petard is useless against an orgue; for if it break one or two of the pieces, they immediately fall down again and fill up the vacancy; or if they stop one or two of the pieces from falling, it is no hindrance to the rest; for being all separate, they have no dependence upon one another.

ORGYA, a fathom.

ORIA, a decayed town of Naples, in Terra d'Otranto, with a citadel, and a bishop's see; seated at the foot of the Apennines, 40 miles N.W. of Otranto. Lon. 17. 48 E. Lat. 40. 39 N.

ORIBASIUS, a celebrated physician, greatly esteemed by the emperor Julian, in whose reign he flourished. He abridged the works of Galenus, and of all the most respectable writers on physic, at the request of the emperor.

ORICHALCUM, or AURICHALCUM. Brass. See BRASS. It is evident, from all accounts, that the orichalcum of the ancients was a fictitious substance, not a natural metal. They made it on the same basis that we make brass at present; but they had several ways of doing it, and distinguished it into several kinds. They had a white sort in frequent use and great esteem; and even the yellow they distinguished into two principal sorts, under different names. The orichalcum and æs flavum, brass and yellow copper, are with us synonymous terms; but with them they were used to express different combinations of the ingredients.

ORICHALCUM, AURICHALCUM ALBUM. White brass. This was a metal well known among the ancients, and celebrated by Aristotle and by Strabo, and others, under the name of χ;αμα λευκον. It was made by mixing an earth with copper, while in fusion; but what that earth was, we are not informed.

None of our methods seem to be the same with theirs, since the metal is debased by all ours, and becomes brittle; whereas, in their management, according to their own accounts, it seems not to have lost any thing of its ductility, though it acquired a peculiar brightness.

ORICUM, or ORICUS, a maritime town of Macedonia, founded by a colony from Colchis, according to Pliny. It had a celebrated harbour, and was greatly esteemed by the Romans on account of its situation, but it was not well defended.

ORIENS, in ancient geography, is taken for all the most eastern parts of the world, such as Parthia, India, Assyria, &c.

ORIENT, or PORT L'ORIENT, a regular and handsome town of France, in the department of Morbihan, built in 1720, by the French East India Company, who made it the exclusive mart of their commerce. The harbour, which is defended by a citadel, opposite Port Louis, at the bottom of the same bay, can contain but a small number of men of war. The English attempted to become masters of it in 1746, but miscarried. It is five miles S.W. of Hennebon. Lon. 3. 20 W. Lat. 47. 46 N.

O'RIENT. *a.* (*oriens*, Latin.) 1. Rising, as the sun (*Milton*). 2. Eastern; oriental. 3. Bright; shining; glittering; gaudy; sparkling (*Bacon*).

O'RIENT. *s.* (*orient*, Fr.) The east; the part where the sun first appears.

ORIE'NTAL. *a.* (*oriental*, Fr.) Eastern; placed in the east; proceeding from the east.

ORIE'NTAL. *s.* An inhabitant of the eastern parts of the world (*Grew*).

ORIE'NTALISM. *s.* (from *oriental*.) An idiom of the eastern languages; an eastern mode of speech.

ORIENTA'LITY. *s.* (from *oriental*.) State of being oriental (*Brown*).

ORIFICE. *s.* (*orificium*, Latin.) Any opening or perforation (*Arbuthnot*).

ORIFLAMB. *s.* A golden standard (*Ainsworth*).

ORIGANUM. Marjoram. In botany, a genus of the class didynamia, order gymnospermia. Calyxes collected by imbricate bractes into a spiked quadrangular cone; corol with the upper lip erect, flat; lower lip three-parted, with nearly equal divisions.

Sixteen species, chiefly natives of Palestine and the south of Europe, or Mediterranean coasts.

The following are the cultivated species.

1. O. vulgare. Common marjoram.
2. O. onites. Pot marjoram.
3. O. marjorana. Sweet or knotted marjoram.
4. O. heracleoticum. Winter sweet marjoram.
5. O. Ægyptiacum. Egyptian marjoram.
6. O. dictamnus. Dittany of Crete.

Two of these have at times found a place in our pharmacopœias, O. vulgare and O. dictamnus. The former grows wild in our own country, has an agreeable aromatic smell, approaching to that of marjoram, and a pungent taste, much resembling thyme, to which it is likewise thought to be more readily allied in its medicinal qualities, and therefore deemed to be emmenagogue, tonic, stomachic, &c. The dried leaves used instead of tea are said to be exceedingly grateful. They are also employed in medicated baths and fomentations. The latter is employed occasionally for the same purposes. See DICTUMNUS CRETICUS, the name under which it is usually prescribed.

There is also another species of this genus, O. Syriacum, or Syrian origanum, introduced occasionally into the materia medica under the name of MARUM, which see. This species possesses long, ternate, peduncled, villous spikes; leaves ovate, villous.

ORIGANY. See ORIGANUM.

ORIGEN, a father of the church, was born at Alexandria in Egypt, about 185, of Christian parents, and surnamed Adamantus, either from his indefatigable application to study, or from the firmness he evinced amid the torments he suffered for the faith. His education was liberal, and his improvement great. He devoted much of his time to the study of the scriptures, and by his exhortations his father was encouraged to endure martyrdom. Origen took up the profession of teaching grammar for his support, and that of his mother and brethren, who depended upon him. Demetrius, bishop of Alexandria, relieved him from this employment, by appointing him catechist of his church. His austerities were very great, and taking the scripture in the most rigid sense, he made an eunuch of himself to become qualified for the kingdom of heaven. From Alexandria he went to Rome, where he began his famous Tetrapla, or Great Bible of different versions. At the command of his bishop he returned to Alexandria, and in 228 was ordained in Palestine by two bishops. His being ordained by foreign bishops without the permission of Demetrius, renewed that prelate's resentment against him; on which Origen hastily returned to Alexandria to endeavour to soften his resentment; but Demetrius drove him from thence in 231, and caused him to be excommunicated, and even deposed in a council held in Egypt. Origen then retired to Cæsarea in Palestine, where he raised a celebrated school, and had St. Gregory Thamaturgus, and a great number of other persons who were illustrious for their virtue and learning, for his disciples. He afterwards travelled to Athens; and then, at the desire of Firmilianus, staid some time at Cæsarea in Cappadocia; whence he was invited into Arabia, to convince and bring back to the truth Beryllus bishop of Bostra, who maintained that the Word had no existence before his incarnation. Origen had the happiness to make him sensible of his mistake; and some years after was sent for into Arabia by an assembly of bishops, to dispute against the Arabians, who maintained that the souls of the dead remained in a state of insensibility till the general resurrection. At length the seventh persecution of the Christians began in the reign of Decius, and none were used with greater severity than Origen. He supported with incredible constancy the dreadful torments which the persecutors of the Christians invented against them; torments that were the more insupportable, as they were made to continue a long time, and as they took the greatest care to prevent his expiring in the midst of his tortures; but in the midst of the most excruciating torments, he discovered an heroic courage, and suffered nothing to escape him that was unworthy a disciple of Jesus Christ. He died at Tyre in 254, aged 69. In all his writings he discovers a surprising degree of modesty, candour, and humility; a noble and sublime genius, profound learning, and vast erudition. His manners were extremely pure, and he had a warm zeal for spreading the truths and morals of the gospels.

Origen is the first ancient writer who maintained the opinion of the restitution of all things. Several other unsound tenets are attributed to him; but these accusations should be received with great caution, because they have originated, principally with Demetrius, who excessively envied his great reputation, and made either truth or falsehood subservient to the blackening of his character.

Much has been written both for and against this celebrated father, both by his contemporaries and others: he has indeed suffered great abuse, which he did not deserve, and which we shall not retail; contenting ourselves with the following account of his character by Dupin, and some remarks on it by Dr. Jortin. "Origen (says Dupin) had very quick parts, a very strong and enlarged imagination; but he relied too much on the vivacity of his genius, and often lost himself, out of too great earnestness to fathom and subtilise every thing. He had a very happy invention, and a more happy delivery of what he invented: but he had not

that exactness in his inventions, nor that gracefulness of delivery, as might be wished. He carried on his works with so great ease, that he is said to have dictated to seven or eight persons at a time; and he was so ready in expressing himself, that he made the greatest part of his homilies extempore: upon which account his style was not very correct or coherent. He had a vast memory, but often trusted too much to it. He was a person of most profound learning: he particularly studied Plato's philosophy, and was indeed too much addicted to it for a Christian. He understood likewise the doctrines of other philosophers. He applied himself mightily to the study of human learning. He was neither ignorant of history nor mythology; and he had as great a knowledge in all the profane sciences, as those who studied nothing else. But he particularly excelled in the knowledge of the Holy Scriptures, which he learned all by heart; and that he might neglect nothing for attaining a right understanding of the letter thereof, he carefully examined all the versions of the Bible, and compared them all together with the Hebrew text, subjoining a literal commentary upon the most difficult places. He was not very well skilled in the Hebrew; yet he knew enough of it to understand it, and to observe the difference of the text and the translations. Nevertheless, he did not adhere to the literal explication of the Bible, but thought it necessary, for the sake of gaining it credit with the heathens, who despised its plainness and simplicity, and of rendering it more useful to the world, to give mystical and allegorical interpretations of every thing in it."

Dr. Jortin tells us, "That Origen was very learned and ingenious, and indefatigably industrious. His whole life from his early years was spent in examining, teaching, and explaining the scriptures, to which he joined the study of philosophy and of all polite literature. He was humble, modest, and patient under great injuries and cruel treatment, which he received from Christians and Pagans: for though he ever had a considerable number of friends and admirers, on account of his amiable qualities and useful accomplishments, he was persecuted and calumniated by men, who had neither his learning nor his virtue, degraded from the order of presbyters, driven from his home, and excommunicated by one Demetrius bishop of Alexandria, who envied him, says Eusebius, for the reputation which he had gained. His inquisitive genius, and his mixing philosophy with christianity, led him perhaps into some learned singularities and ingenious reveries; but he was by temper far from dogmatizing in such points, from fomenting schisms, and setting up himself for the head of a party. He lived in times when Christians were not so shackled with systems and determinations, as they were afterwards, nor so much exposed to disingenuous and illiberal objections; and had more liberty to pursue their inquiries and to speak their mind. He was ever extremely sober and exemplary, practising what he preached to others; and he lived and died poor, and destitute even of common conveniences."

Origen was the author of a great number of excellent works. The principal of those which have been handed down to us are, 1. A Treatise against Celsus, of which Spencer has given a good edition in Greek and Latin, with notes: this learned treatise has been translated into French by Elias Bouhereau, a protestant minister born at Rochelle. 2. A great number of Homilies, with Commentaries on the Holy Scriptures. 3. Philocalia, and several other treatises. 4. Fragments of his Hexaples, collected by father Montfaucon, in two volumes folio. Of all Origen's books, the loss of the Hexaples is most to be regretted. This work was thus named from its containing six columns; in the first of which was the Hebrew text of the Bible; in the second, the same text in Greek characters; in the third, the Greek version of the Septuagint; in the fourth, that of Aquila; in the fifth, that of Symacchus; and in the sixth, Theodosian's Greek version. This admirable work gave the first hint for our Polyglot Bibles. 5. The book of Principles; of which we have only an incorrect Latin version. Till lately the most complete edition of his works was that of father Delarue, a Benedictine, in Greek and Latin. The celebrated Montfaucon likewise published, in 2 vols. folio, some remains and fragments of his Hexapla. But we must now mention, Origenis Adamantii opera omnia, ad editionem Parisensem, Caroli de la Rue recusa, Gr. et Lat. a Franc. Oberthur, 8vo. Wirceburgi, 1780, et ann. seq. vol. 1—9. This is a very neat edition, and forms a part of the Sanctorum Patrum Græcorum Opera Palemica, begun by Oberthur, at Wurceburg, in 1777.

This Origen ought not to be confounded with another Origen, a Platonic philosopher, and the disciple and friend of Porphyry, who studied philosophy under Ammonius: perhaps this Origen was the founder of the Origenians.

ORIGENIANS (*origeniani*), ancient heretics, who even surpassed the abominations of the Gnostics. Epiphanius speaks of them as subsisting in his time; but their numbers, he says, were inconsiderable. He seems to fix their rise about the time of the great Origen; but does not say that they derived their name from him. On the contrary, he distinguishes them from the Origenists, whom he derives from Origen Adamantius; adding, indeed, that they first took their name from one Origen; by which he intimates, that it was not the great Origen. And St. Augustine expressly asserts, that it was another. Their doctrines were shameful: they rejected marriage; they used several apocryphal books, as the acts of St. Andrew, &c. and endeavoured to excuse their open crimes, by saying, that the catholics did the same in private.

ORIGENISTS, in church-history, a Christian sect in the fourth century, so called from their drawing their opinions from erroneous interpretations of the writings of Origen. The

Origenists maintained, that the souls of men had a pre-existent state; that they were holy intelligences, and had sinned in heaven before the body was created; that Christ is only the son of God by adoption; that he has been successively united with all the angelical natures, and has been a cherub, a seraph, and all the celestial virtues one after another; that, in future ages, he will be crucified for the salvation of the devils, as he has already been for that of men; and that their punishment, and that of the damned, will continue only for a certain limited time.

O'RIGIN. ORI'GINAL. *s.* (*origine*, Fr. *origo*, Latin.) 1. Beginning; first existence (*Bentley*). 2. Fountain; source; that which gives beginning or existence (*Atterbury*). 3. First copy; archetype. In this sense *origin* is not used (*Locke*). 4. Derivation; descent (*Dryden*).

ORI'GINAL. *a.* (*originel*, Fr. *originalis*, Lat.) Primitive; pristine; first (*Stillingfleet*.)

ORI'GINALLY. *ad.* (from *original*.) 1. Primarily; with regard to the first cause; from the beginning (*Smalridge*). 2. At first (*Woodward*). 3. As the first author (*Roscommon*).

ORI'GINALNESS. *s.* (from *original*.) The quality or state of being original.

ORI'GINARY. *a.* (*originaire*, French.) 1. Productive; causing existence (*Cheyne*.) 2. Primitive; that which was the first state (*Sandys*).

To ORI'GINATE. *v. a.* (from *origin*.) To bring into existence.

To ORI'GINATE. *v. n.* To take existence.

ORIGINA'TION. *s.* (*originatio*, Latin.) 1. The act or mode of bringing into existence; first introduction (*Keil*). 2. Descent from a primitive (*Pearson*).

ORIGUELA, a town of Spain, in Valencia, with a bishop's see, a university, and a citadel built on a rock. It is seated on the Segura, 33 miles N. of Carthagena. Lon. 1. 3 W. Lat. 38. 10 N.

ORILLON, in fortification, is a small rounding of earth faced with a wall; raised on the shoulder of those bastions that have casements, to cover the cannon in the retired flank, and prevent their being dismounted by the enemy.

ORIO, a town of Spain, in Guipuscoa, at the mouth of the Orio, eight miles S.W. of St. Sebastian. Lon. 2. 19 W. Lat. 43. 23 N.

ORIOLE, in ornithology. See ORIOLUS.

ORIOLUS. Oriole. In zoology, a genus of the class aves, order picæ. Bill conic, convex, very sharp and straight; upper mandible a little longer, slightly notched; tongue bifid, sharp-pointed; feet ambulatory. Fifty-one species, chiefly inhabitants of America, one only found in our country. They are gregarious, noisy, numerous, voracious, and great devourers of corn: they often build pendulous nests. The following are the chief species.

1. O. galbula. Golden oriole. Pale yellow; lores and limbs black; outer tail feathers on the hind part yellow: bill and irids red. Female; dusky brownish green, lateral tail feathers yellowish white. Inhabits Europe, Asia, and Africa; nine and a half inches long; is migratory; feeds on cherries, berries, and insects; is occasionally found in our own country: builds an urceolate nest of leaves in the branches of trees, and lays four or five dirty-white eggs with small dusky-brown spots; voice sharp; flesh good.

There are four or five other varieties, chiefly from variation of colour, found in Cochinchina and India.

2. O. icterus. Icteric oriole. Tawny: head, throat, back, quill and tail-feathers black; wings with a white spot. Inhabits the warmer parts of America and the Caribbees; active and bold; builds a large cylindrical nest, hanging from the extreme branch of a tree; is domesticated in America for the purpose of destroying insects: nine and a half inches long.

3. O. phœniceus. Red-winged oriole. Black; wing-coverts tawny. Inhabits in vast flocks from New York as far as New Spain; from eight to nine inches long; is very destructive to rice-plantations, and devours likewise the swarms of insects and worms that infest the low grounds; builds a thick pensile nest between reeds, and just beyond the reach of floods; eggs white with a few scattered black streaks.

There is another variety with red shoulders, edged with yellow; an inhabitant of Africa.

4. O. Persicus. Black and yellow oriole. Black; hind part of the back, spot on the wing-coverts, and base of the tail-feathers yellow. There are two or three other varieties from variations of colour. Inhabits South America; forms a pendent nest, shaped like an alembic, on the extreme branches of trees; sometimes four hundred nests are found hanging from the same tree; eggs dirty white, with small pale-brown spots.

5. O. Bonana. Bonana oriole. Tawny; head and breast chesnut; back, quill and tail-feathers black. Inhabits South America and the Caribbee Islands; seven inches long; forms a nest of leaves and stalks under a plantain leaf, the leaf itself constituting one end.

6. O. nidipendulus. Hang-nest oriole. Frontlet and wreath black; crown, neck, back and tail reddish-brown; breast and belly tawny-yellow. Inhabits the woods in Jamaica; sings charmingly; builds a pendulous nest on the extreme branch of a high tree.

7. O. niger Black oriole. Totally black. Female, greenish-brown. Inhabits North America; about ten inches long; is gregarious, and in breeding time sings delightfully: feeds on worms and beetles; builds in trees about eight feet from the ground, and lays five eggs, dusky, with black spots.

ORION, in fabulous history, a celebrated giant, sprung from the urine of Jupiter, Neptune, and Mercury. These three gods, pleased with the hospitality they received from the peasant Hyricus, and the piety he exhibited as

they travelled through Bœotia in disguise, promised to grant him whatever he required; and the old man desired a son without another marriage. The gods consented, and they ordered him to bury in the ground the skin of the victim, into which they had all three made water. Hyricus did as they commanded, and when, nine months after, he dug for the skin, he found in it a beautiful child, whom he called *Urion, ab urina*. The name was changed into Orion by the corruption of one letter, as Ovid says, *Perdidit antiquam littera prima sonum*. Orion soon rendered himself celebrated, and Diana took him among her attendants, and even became deeply enamoured of him. His gigantic stature, however, displeased Œnopion, king of Chios, who promised to make him his son-in-law as soon as he delivered his island from wild beasts. This task was soon performed by Orion, but Œnopion intoxicated his guest, and put out his eyes on the sea shore, where he had laid himself down to sleep. Orion, however, miraculously recovered his sight, it is said, by turning his face to the rising sun, and amply punished the perfidy of Œnopion. It is said, that Orion was an excellent workman in iron, and that he fabricated a subterraneous palace for Vulcan. Aurora, whom Venus had inspired with love, carried him away into the island of Delos, to enjoy his company with greater security; but Diana, who was jealous of this, destroyed Orion with with her arrows. According to Ovid, Orion died of the bite of a scorpion, which the earth produced, to punish his vanity in boasting that there was not on earth any animal which he could not conquer. After death, Orion was placed in heaven, where one of the constellations still bears his name. The constellation of Orion, placed near the feet of the bull, was composed of 17 stars in the form of a man holding a sword, which has given occasion to the poets often to speak of Orion's sword. As the constellation of Orion is generally supposed to be accompanied, at its rising, with great rains and storms, it has acquired the epithet of *aquosus* given it by Virgil. Orion was buried in the island of Delos.

Orion, in astronomy, one of the constellations of the southern hemisphere.

The word is formed from the Greek ουρειν, to make water; the ancients supposing, that it raised tempests at its rising and setting.

The stars in the constellation Orion, in Ptolemy's catalogue, are thirty-eight; in Tycho's 42, Hevelius's sixty-two, in the Britannic catalogue seventy-eight, viz. 2, 4, 3, 13, 21, 35, reckoned in the order of their magnitudes.

Orion's river. See Eridanus.

ORISON. *s.* (*oraison*, Fr.) A prayer; a supplication (*Milton*).

ORIS CONSTRICTOR. In anatomy. See Orbicularis oris.

ORISSA, a province of the peninsula of Hindustan, bounded on the N. by Bahar and Bengal, on the W. by Berar, on the S. by Golconda, and on the E. by the bay of Bengal. The district of Midniapour, in this province, is subject to the English East India Company; but all the rest belongs to the Berar Mahrattas.

ORISTAGNI, an ancient town of Sardinia, with a good harbour and an archbishop's see. It is large, and well fortified, but thinly inhabited, on account of the unhealthy air. It is seated on the west coast, on a bay of the same name, 42 miles N.W. of Cagliari. Lon. 8. 51 E. Lat. 40. 2 N.

ORIXA, in botany, a genus of the class tetrandria, order monogynia. Petals four, lanceolate; calyx four-parted; stigma capitate; capsule uncertain. One species, a Japan shrub; flexuous; branches alternate; leaves alternate, ovate, entire, above green, beneath paler and villous; flowers in alternate racemes.

ORKNEY ISLANDS, a cluster of islands north of Scotland, from which they are separated by Pentland Frith. They are twenty-six in number, of which one greatly exceeds the other in extent. This, like the principal one of Shetland, is dignified with the appellation of Mainland: it is also frequently called Pomona. (See Mainland.) Beyond this island, to the north-east are seen, among others, Rowsay and Westra, Shappinsha and Edda, Stronsa, Sanda, and North Ronalsha; and to the south appear Hoy, and South Ronalsha, with others of inferior note. The currents and tides which flow between these islands are extremely rapid and dangerous; and near the small isle of Swinna are two whirlpools, that have been known to snatch in boats and light vessels, which were instantly swallowed up. Springs of pure water are found in all the mountainous parts of these islands; and there are numerous lakes and rivulets abounding in fish. The heath, on these mountains, shelters grouse, plovers, snipes, &c. but here are neither partridges, hares, nor foxes. There are numbers of sheep and small black-cattle. The products of the vallies and plains are big and oats, but no other sort of grain. In general, the air is moist; and they are often visited by dreadful storms of wind, rain, and thunder. For about three weeks in midsummer, they enjoy the sight of the sun, almost without intermission: but, for the same space in winter, that luminary hardly rises above the horizon, and is commonly obscured by clouds and mists. In this gloomy season, the absence of day is supplied partly by moonlight, and partly by the radiance of the Aurora Borealis. See Shetland. The chief exports are linen and woollen yarn, stockings, butter, dried fish, herrings, oil, feathers and skins of various kinds, and kelp. The English language prevails in all these islands, though there are many words in the Norse, or Norwegian, still in use. The churches are numerous; but the office of a minister is truly laborious, the parochial duty being often extended to several distant islands.

ORLE, Orlet, or Orlo, in architecture, a fillet, under the ovolo, or quarter round of a capital. When it is at the top or bottom of

a shaft, it is called cincture. Palladio uses the word orlo for the plenith of the bases of the columns.

ORLEANA TERRA. (*orleana*, so named from the place where it grows.) The substance so called is a ceraceous mass obtained from the seeds of the bixa orleana of Linnéus. In Jamaica and warm climates it is considered as a useful remedy in dysentery, possessing adstringent and stomachic qualities.

ORLEANOIS, a late province of France, now forming the department of Loiret. It is divided by the river Loire into the Upper and Lower, and is a very plentiful country.

ORLEANS, an ancient city of France, capital of the department of Loiret and late province of Orleanois, with an episcopal see. It is seated on the Loire, in the form of an oval, and is supposed to contain 40,000 souls. Under the sons of Clovis, it was the capital of a kingdom. It stood a memorable siege in 1428, against the English, which was raised by the celebrated Joan of Arc, called the Maid of Orleans. The streets of Orleans are spacious and pleasant, and that of the fauxbourg of Paris is of a prodigious length. Its commerce consists in wine, brandy, corn, grocery, and particularly sugar, which is brought raw from Nantes and Rochelle. Sheep skins, and stockings, both knit and woven, form also a considerable article of trade. The fauxbourg or suburb of Olivet, on the left side of the Loire, has a communication with the city by a bridge of nine arches, the centre one 100 feet wide. Near the city is a forest, containing 100,000 acres, planted with oak and other valuable trees. Orleans is 30 miles N.E. of Blois, and 60 S.S.W. of Paris. Lon. 1. 59 E. Lat. 47. 54 N.

Orleans (Louis duke of), a pious prince of France, was the son of Philip the regent, and born at Versailles in 1703. On his father's death he married Augusta Maria of Baden, who died in 1726, having been married only two years. The prince was deeply sensible of the loss, and betook himself to the consolations of religion for support. He retired in 1730 to the abbey of St. Genevieve, where he led a life of great austerity. The instances of his mortification render him an object of pity; but the motives of his conduct, and his extensive liberality, entitle him to admiration. He adhered steadily to this course of life above 20 years, and died in 1752. His writings are numerous.

Orleans (Peter Joseph), a French jesuit; born at Bruges in 1641, and died in 1698. He wrote a history of the Revolutions in England, under the Stuarts. He was the author of some other works.

ORLOPE, in the sea language, the uppermost space or deck in a great ship, reaching from the main to the mizen mast. In three deck ships, the second and lowest decks are sometimes called orlopes.

ORMOND, the northern division of the county of Tipperary, in the province of Munster in Ireland. For a long time it gave the title of earl, and afterwards of marquis and duke, to the noble family of Butler, descended from a sister of Thomas à Becket archbishop of Canterbury; till, at the accession of George I. the last duke was attainted of high treason, and died abroad. In that part of the country the family had great prerogatives and privileges granted by Edward III.

ORMSIDE, a town of England, near Appleby, in Westmoreland, with a church and parish, but small. A great number of vessels of brass, some of which seemed to have been gilt, were discovered near the manor-house, by the water washing away the soil. The manor-house is built castleways.

ORMSKIRK, in Lancashire, in England, is a handsome town, with a good inland trade. By the late inland navigation, it has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Stafford, Warwick, Leicester, Oxford, Worcester, &c. There is a bituminous earth about this place, from which oil of amber is extracted, that preserves raw flesh, and serves the poor people instead of candles. There is nothing remarkable at Ormskirk, but the monuments of some of the ancient family of the Stanleys before they were ennobled. Not far from it is Latham house; to which belongs a large estate, and a fine park. It is remarkable only because it was gallantly defended in the civil wars by lady Charlotte countess of Derby, who held it to the last extremity against the parliament forces, which could never oblige her to capitulate. She held out gloriously till she was relieved by prince Rupert. It was, however, ruined in a second siege; and sold by the family to the late sir Thomas Bootle, who built a very magnificent house upon it.

ORMUS, a small island, in a strait of the same name, at the entrance of the gulf of Persia, nine miles S. of Gombron. In 1507, the Portuguese were permitted to form a settlement here; and it was afterward frequented by a number of rich merchants. In 1622, the Persians, by the assistance of the English, expelled the Portuguese, and demolished the buildings. Some time after, the Persians rebuilt the fort, and though they could never bring it to be a place of trade as before, it is still the key of the gulf of Persia, on account of the commodiousness of the harbour. It is almost deserted; for it produces nothing but salt, which sometimes is two inches deep upon the surface of the earth. Lon. 56. 25 E. Lat. 27. 20 N.

ORNAMENT. *s.* (*ornamentum*, Latin.) 1. Embellishment; decoration (*Rogers*). 2. Honour; that which confers dignity (*Addison*).

ORNAMENTAL. *a.* (from *ornament.*) Serving to decoration; giving embellishment (*Swift*).

ORNAMENTALLY. *ad.* In such a manner as may confer embellishment.

ORNAMENTED. *a.* (from *ornament.*) Embellished; bedecked.

ORNATE. *a.* (*ornatus*, Lat.) Bedecked; decorated; fine (*Milton*).

ORNATENESS. *s.* (from *ornate.*) Finery; state of being embellished.

ORNATURE. *s.* (*ornatus*, Latin.) Decoration (*Ainsworth*).

ORNE, a department of France, including the late province of Perche and part of that of Normandy. It takes its name from a river, which rises in the department, and runs into the English channel, eight miles below Caen. The capital is Alençon.

ORNITHOGALUM. Star of Bethlehem. In botany, a genus of the class hexandria, order monogynia. Corol six-petalled, erect, permanent, spreading from about the middle; filaments dilated at the base; capsule superior, three-celled; seeds roundish, naked. Forty-three species. South of Europe; Siberia; Cape: three common to the woods and pastures of our own country.

The species chiefly cultivated are,

1. O. umbellatum. Umbelled star of Bethlehem.

2. O. luteum. Yellow star of Bethlehem.

3. O. minimum. Small star of Bethlehem.

4. O. Pyrenaicum. Pyrenean star of Bethlehem.

5. O. latifolium. Broad-leaved star of Bethlehem.

6. O. pyramidale. Pyramidal star of Bethlehem.

7. O. unifolium. One-leaved star of Bethlehem.

8. O. nutans. Neapolitan star of Bethlehem.

9. O. Capense. Cape ornithogalum.

10. O. aureum. Golden star of Bethlehem.

Many of these are hardy, and highly ornamental among other flowering bulbous-rooted plants in borders and clumps.

ORNITHOGLOSSUM. (*ornithoglossum*, ορνιθογλωσσον, from ορνις, a bird, and γλωσσα, a tongue, so called from its shape.) Birds tongue. The seeds of the ash tree, as sometimes so called.

ORNITHOLITHUS. In oryctology, a genus of the class petrifactions, order animal. The body or parts of a bird changed into a fossile substance. Three species.

1. O. rostri. The beak of birds. Found in the neighbourhood of Jena, and in the mountains on the confines of Switzerland, sometimes perfect, sometimes only impressed on a schistose swinestone.

2. O. ossium. The bones of birds. Found in Silesia.

3. O. plumarum. The feathers of birds. Found principally at Oenengen on the confines of Switzerland, impressed on a schistose swinestone.

ORNITHOLOGY. (from ορνις, a bird, and λογος, a treatise or discourse). The science which treats of birds; describes their form external and internal; and teaches their economy and uses.

Of all the departments of natural history, ornithology appears to be that which has been followed up with the greatest degree of avidity, while it is that which has perhaps offered the greatest degree of difficulty. In respect to ourselves, birds, like fishes, exist in a region into which it is difficult to follow them; great numbers of them are perpetually migrating from climate to climate, and still more of them are so frequently shifting their plumage and colour at different seasons of the year, or different periods of life, or assume so dissimilar an appearance from a completion of sex, that nothing but a very long, and repeated, and accurate attention to them, difficult as such an attention must be under such circumstances, can enable us to speak with any decision concerning their individuality, or even generic station. To furnish therefore a history of birds as complete as that of quadrupeds, must necessarily prove the work of ages; and from these causes, M. Buffon justly asserts, that the number and characters of birds are still in an ocean of obscurity.

In travelling through this multifarious group, we shall avail ourselves of every light that may prevent our wandering, and freely consult every writer of authority who has already arranged or described this part of the animal kingdom. The natural history of birds comprehends two distinct objects: first, the discovery and classification of every individual, and assigning it a name; and, secondly, the describing its manners and economy. The first, which is the most difficult part of the subject, is also the least agreeable: it is dry, mechanical, and incomplete. The second exhibits new pictures to the imagination; and, by leading to the developement of final causes, opens delightful views of the economy of nature, and of the wisdom of Providence. Both are necessary to those who would understand this science in its utmost extent; and both, accordingly, have been attempted by ornithologists, in different systems and arrangements.

We shall examine both these points in the following six sections, which will treat progressively of the classification of birds; their external characters; their flight, plumage and migration; their food, longevity, diseases and fertility; their nidification and incubation; and their general uses in the economy of nature.

SECTION I. *Classification of Birds.*

When we inquire into the history of ornithology, at various periods, we find it in three different stages of improvement. To the first of these it was brought by Aristotle and Pliny, who are, almost the only authors of antiquity who seem to have directed their attention to this branch of science. They, however, contented themselves with seizing upon the great outlines of natural knowledge; passing by what appeared trivial or common, they dwelt principally on whatever was new, marvellous, or astonishing. Like historians who describe the operations of a campaign, they have characterised the generals, but left it to meaner hands to carry the muster-roll. Despising the minutiæ of a dry detail, they amuse the reader, and warm his imagination, not unfrequently at the expence of truth. The moderns, who, after the revival of learning, resumed this subject, have treated it in a manner totally different: they have divided birds into orders, genera and species, ac-

cording as they appeared analogous, either from their habits or external form. By thus classing together birds resembling each other, in one distinct family, they have facilitated the study, and given the subject a scientific arrangement.

Their systems, however, though useful to the profound naturalist, prove tedious and uninteresting to the ordinary reader: they present to him a dry detail of names; a fatiguing repetition of colours, shades, size and shapes of similar animals, which he may have recourse to as a dictionary, but which must unavoidably disgust, should he attempt a continued perusal. Their successors, in later times, with that judgment and good sense which they have carried into every department of science, have endeavoured to unite these different aims. They have joined the history of their manners and economy to scientific arrangement: they have blended the dry details of the nomenclator with the more entertaining displays of the life and conversation of these animals, that are worthy of the philosopher or historian.

M. Belon, a French author, is the first among the moderns who applied himself to this study, and may be regarded as the father of systematic ornithology. By arranging such birds into separate orders and families, as he deemed analogous in their manners or external characters, he exalted his subject to the dignity of a science. Were we to judge of him by the extent of his travels in Europe, Asia, and Africa, undertaken at his own expence, we could not hesitate to pronounce him an eager inquirer into nature. His work, incomplete as it may now appear, yet, considering the infancy in which he found the science, displays considerable accuracy of observation, and entitles the author to no small degree of reputation. If he has marked out the way, and cleared it of its most striking difficulties, we owe him much; for it is certainly easier to make advances in a path that has already been trod by others, than to venture through the unexplored wild, lying still in primeval confusion.

After the year 1555, in which Belon published his history of birds, he was immediately succeeded by a long list of writers, who followed or improved upon his system. Gesner in Switzerland, Aldrovandi in Italy, Johnston in Holland, published each a system of ornithology. Few additions, however, of any importance, were made to the natural history of birds till the appearance of our countryman, the hon. Francis Willoughby, who seems to have been impelled to the study of nature by the original bent of a strong genius, which his ample fortune enabled him to indulge. His travels were extensive, and his knowledge proportioned to his ardour in the pursuit of it. Though he died at an early period, he had figured and described a greater number of birds, and with more accuracy, than any former naturalist. His papers came into the hands of his preceptor Mr. Ray, and were published in 1678. To him they are probably indebted for that excellent arrangement, which constitutes the chief merit of a work, which is acknowledged, at the present day, to be one of the most valuable on this part of the animal kingdom.

To this system almost all our ornithologists of our own times have been largely indebted. Mr. Pennant freely acknowledges his obligations, and the streams through which he was obliged. "Mr. Ray," observes he, "and his illustrious pupil the hon. Francis Willoughby, assumed Belon's plan; but, with great judgment, flung into their proper stations, and proper genera, those which he had confusedly mixed together. They formed the great division of terrestrial and aquatic birds; they made every species toccupy their proper place, consulting at once exterior form, and natural habit. They could not bear the affected intervention of aquatic birds in the midst of terrestrial birds. They placed the last by themselves, clear and distinct from those whose haunts and economy were so different.

"Mr. Ray's general plan," continues he, "is so judicious, that to me it seems scarcely possible to make any change in it for the better; yet, notwithstanding he was in a manner the founder of systematic zoology, later discoveries have made a few improvements on his labours. My candid friend Linnéus will not take it amiss, that I in part neglect his example; for I permit the land-fowl to follow one another, undivided by the water-fowl, the grallæ and anseres of his system; but, in my generical arrangement, I most punctually attend to the order he has given in his several divisions, except in those of his anseres and a few of his grallæ. For, after the manner of M. Brisson, I make a distinct order of water-fowl with pinnated feet, placing them between the waders, or cloven footed water-fowl and the web-footed. The ostrich, and land birds with wings useless for flight, I place as a distinct order. The trumpeter (psophia of Linnéus) and the bustards, I place at the end of the gallinaceous tribe: all are land-birds: the first multiparous, like the generality of the gallinaceous tribe; the last granivorous, swift runners, avoiders of wet places; and both have bills somewhat arched. It must be confessed, that both have legs naked above the knees, and the last, like the waders, lay but few eggs. They seem ambiguous birds, that have affinity with each other; and it is hoped, that each naturalist may be indulged the toleration of placing them as suits his own opinion."

The following therefore is the improved system of Mr. Pennant, whose orders we shall contrast with those of Linnéus; and we give it the rather in this place, because from the multiplicity of matter that will throng upon us in the article of Zoology, we are already aware that we shall not be able to introduce it under that head.

Division I.—LAND-BIRDS.

Divison II.—WATER-FOWL.

Division I.

Order	I.	Rapacious,	Accipitres, *Lin.*
	II.	Pies,	Picæ.
	III.	Gallinaceous,	Gallinæ.
	IV.	Columbine,	Passeres.
	V.	Passerine,	Passeres.
	VI.	Struthious,	Gallinæ. Grallæ.

Division II.

Order	VII.	Cloved-footed or waders,	Grallæ.
	VIII.	Pinnated feet,	Anseres. Grallæ.
	XI.	Web-footed,	Anseres. Grallæ.

Div. I.

Order I.—*Rapacious.*

1	Vulture,	Vultur.
2	Falcon,	Falco.
3	Owl,	Strix.

Order II.—*Pies.*

4	Shrike,	Lanius.
5	Parrot,	Psittacus.

6	Toucan,	Ramphastos.
7	Motmot,	Ramphastos.
8	Hornbill,	Buceros.
9	Beefeater,	Buphaga.
10	Ani,	Crotophaga.
11	Wattle.	
12	Crow,	Corvus.
13	Roller,	Coracias.
14	Oriolle,	Oriolus.
15	Grakle,	Gracula.
16	Paradise,	Paradisæa.
17	Curucui,	Trogon.
18	Barbet,	Bucco.
19	Cuckoo,	Cuculus.
20	Wryneck,	Jynx.
21	Woodpecker,	Picus.
22	Jacamar,	Alcedo.
23	Kingsfisher,	Alcedo.
24	Nuthatch,	Sitta.
25	Tody,	Todus.
26	Bee-eater,	Merops.
27	Hoopoe,	Upupa.
28	Creeper,	Certhia.
29	Honeysucker,	Trochilus.

Order III.—*Gallinaceous.*

30	Cock,	Phasianus.
31	Turkey,	Meleagris.
32	Pintado,	Numida.
33	Curasso,	Crax.
34	Peacock,	Pavo.
35	Pheasant,	Phasianus.
36	Grous,	Tetrao.
37	Partridge,	Tetrao.
38	Trumpeter,	Psophia.
39	Bastard,	Otis.

Order IV.—*Columbine.*

40	Pigeon,	Columba.

Order V.—*Passerine.*

41	Stare,	Sturnus.
42	Thrush,	Turdus.
43	Chatterer,	Ampelis.
44	Coly,	Loxia.
45	Grosbeak,	Loxia.
46	Bunting,	Emberiza.
47	Tanager,	Tanagra.
48	Finch,	Fringilla.
49	Flycatcher,	Muscicapa.
50	Lark,	Alauda.
51	Wagtail,	Motacilla.
52	Warblers,	Motacilla.
53	Manakin,	Pipra.
54	Titmouse,	Parus.
55	Swallow,	Hirundo.
56	Goatsucker,	Caprimulgus.

Order VI.—*Struthious.*

57	Dodo,	Didus.
58	Ostrich,	Struthio.

Div. II.

Order VII.—*Cloven-footed, or Waders.*

59	Spoonbill,	Platalea.
60	Screamer,	Palamedea.
61	Jabiru,	Mycteria.
62	Boatbill,	Cancroma.
63	Heron,	Ardea.
64	Umbre,	Scopus, *Briss.*
65	Ibis,	Tantalaus.
66	Curlew,	Scolopax.
67	Snipe,	Scolopax.
68	Sandpiper,	Tringa.
69	Plover,	Charadrius.
70	Oystercatcher,	Hæmatopus.
71	Jacana,	Parra.
72	Pratincole,	Hirundo.
73	Rail,	Rallus.
74	Sheathbill.	
75	Gallinule,	Fulica.

Order VIII.—*Pinnated-feet.*

76	Phalarope,	Tringa.
77	Coot,	Fulica.
78	Grebe,	Colymbus.

Order IX.—*Web-footed.*

79	Avosetta,	Recurvirostra.
80	Courier,	Corrira, *Briss.*
81	Flammant,	Phœnicopterus.
82	Albatross,	Diomedia.
83	Auk,	Alca.
84	Guillemot,	Colymbus.
85	Diver,	Colymbus.
86	Skimmer,	Rhyncops.
87	Tern,	Sterna.
88	Gull,	Larus.
89	Petrel,	Procellaria.
90	Merganser,	Mergus.
91	Duck,	Anas.
92	Pinguin	Diomedea. Phaeton.
93	Pelican,	Pelicanus.
94	Tropic,	Phaeton.
95	Darter,	Plotus.

To the above, we have thought it necessary to subjoin an extract of the orders and genera as they stand in the Index Ornithologicus and General Synopsis of Birds as published by Mr. Latham; as from the copious manner in which he has treated the subject, and from a very great addition he has been enabled to make to this branch of natural history, some deviations from the plan of preceding authors, as well as the formation of some new genera, have necessarily arisen.

Table of the Orders and Genera of Birds, according to Mr. Latham.

Ind. Orn. AVIUM ORDINES.	*Syn. of Birds.* ORDERS OF BIRDS.
Div. I.	Div. I.
I. Accipitres,	Rapacious.
II. Picæ,	Pies.
III. Passeres,	Passerine.
IV. Columbæ,	Columbine.
V. Gallinæ,	Gallinaceous.
VI. Struthiones,	Strathious.
Div. II.	Div. II.
VII. Grallæ,	Waders.
VIII. Pinnatipedes,	Pinnated-feet.
IX. Palmipedes,	Web-footed.

AVIUM GENERA.	GENERA OF BIRDS.
Div. I.	Div. I.
AVES TERRESTRES.	LAND BIRDS.
Ordo I. *Accipitres.*	Order I. *Rapacious.*
1 Vultur,	Vulture.
2 Falco,	Falcon.
3 Strix,	Owl.
Ordo II. *Picæ.*	Order II. *Pies.*
4 Lanius,	Shrike.
5 Psittacus,	Parrot.
6 Ramphastos,	Toucan.
7 Momotus,	Motmot.
8 Scythrops.	
9 Buceros,	Hornbill.

Ind. Orn.	*Syn. of Birds.*
10 Buphaga,	Beefeater.
11 Crotophaga,	Ani.
12 Callæas,	Wattle-bird.
13 Corvus,	Crow.
14 Coracias,	Roller.
15 Oriolus,	Oriole.
16 Gracula,	Grakle.
17 Paradisæa,	Paradise-bird.
18 Trogon,	Curucui.
19 Bucco,	Barbet.
20 Cuculus,	Cuckoo.
21 Yunx,	Wryneck.
22 Picus,	Woodpecker.
23 Galbula,	Jacamar.
24 Alcedo,	Kingsfisher.
25 Sitta,	Nuthatch.
26 Todus,	Tody.
27 Merops,	Bee-eater.
28 Upupa,	Hoopoe.
29 Certhia,	Creeper.
30 Trochilus,	Humming-bird.
Ordo III. *Passeres.*	Order III. *Passerine.*
31 Sturnus,	Starling
32 Turdus,	Thrush.
33 Ampelis,	Chatterer.
34 Colius,	Coly.
35 Loxia,	Grosbeak.
36 Imberiza,	Bunting.
37 Tanagra,	Tanager.
38 Fringilla,	Finch.
39 Phytotoma.	
40 Muscicapa,	Flycatcher.
41 Alauda.	Lark.
42 Motacilla,	Wagtail.
43 Sylvia,	Warbler.
44 Pipra,	Manakin.
45 Parus,	Titmouse.
46 Hirundo,	Swallow.
47 Caprimulgus,	Goatsucker.
Ordo IV. *Columbæ.*	Order IV. *Columbine.*
48 Columba,	Pigeon.
Ordo V. *Gallinæ.*	Order V. *Gallinaceous.*
49 Pavo,	Peacock.
50 Meleagris,	Turkey.
51 Penelope.	
52 Numida,	Pintado.
53 Crax,	Currasso.
54 Phasianus,	Pheasant.
55 Tinamus,	Tinamou.
56 Tetrao,	Grous.
57 Perdix,	Partridge.
58 Psophia,	Trumpeter.
59 Otis,	Bustard.
Ordo VI. *Struthiones.*	Order VI. *Struthious.*
60 Didus,	Dodo.
61 Struthio,	African Ostrich.
62 Casuarius,	Cassowary.
63 Rhea,	American Ostrich.
Div. II. AVES AQUATICÆ.	Div. II. WATER-BIRDS.
Ordo VII. *Grallæ.*	Order VII. *Waders.*
64 Platalea.	Spoonbill.
65 Palamedea,	Screamer.
66 Mycteria,	Jabiru.
67 Cancroma,	Boatbill.
68 Scopus,	Umbre.
69 Ardea,	Heron.
70 Tantalus,	Ibis.
71 Numenius,	Curlew.
72 Scolopax,	Snipe.
73 Tringa,	Sandpiper.
74 Charadrius,	Plover.
75 Cursorius.	
76 Hæmatopus,	Oyster-catcher.
77 Glareola,	Pratincole.
78 Rallus,	Rail.
79 Parra,	Jacana.
80 Gallinula,	Gallinule,
81 Vaginalis,	Sheath-bill,
Ordo VIII. *Pinnatipedes.*	Order VIII. *With Pinnated-feet.*
82 Phalaropus,	Phalarope.
83 Fulica,	Coot.
84 Podiceps,	Grebe.
Ordo IX. *Palmipedes.*	Order IX. *Web-footed.*
* *Pedibus longioribus,*	**With long legs.*
85 Recurvirostra,	Avoset.
86 Corrira,	Courier.
87 Phœnicopterus,	Flamingo.
†† *Pedibus brevioribus,*	††*With short legs.*
88 Diomedea,	Albatross.
89 Alca,	Auk.
90 Uria,	Guillemot
91 Colymbus,	Diver.
92 Rhynchops,	Skimmer.
93 Sterna,	Tern.
94 Larus,	Gull.
95 Procellaria,	Petrel.
96 Mergus,	Merganser.
97 Anas,	Duck.
98 Aptenodytes,	Pinguin.
99 Pelecanus,	Pelican,
100 Phaëton,	Tropic-bird.
101 Plotus,	Darter.

Besides these great systematizers and historians, several authors have given treatises of a local nature. White has made us acquainted with the natural history of Selborne; Smith with that of the county of Kerry; Marcgrave has described the birds of Brazil, Sir Hans Sloane those of Jamaica; and Catesby those of Florida, Carolina, Virginia, and the Bahama islands. With these abundant resources, the ornithologist can scarcely want information: his greatest difficulty will be found in condensing and arranging his materials, so as to render his narrative of moderate length, and of general utility.

SECTION II.—*External Characters of Birds.*

Birds have always been considered as a separate and detached class of animals: it is not, however, by their power of flying alone, that they have been thus distinguished. A species of the squirrel, and the bat tribe among quadrupeds, and the flying fish among the finny kinds, are endowed with the same faculty. On the other hand, birds of the struthious description, as the dodo and the ostrich, from their immense weight, are wholly prevented from ascending into the regions of the air by means of their wings. Still, however, birds in their external characters differ remarkably from other animals: they are distinguishable by their covering of feathers; by their wings, the instruments of flight; by the form of their legs and feet, and the whole of the outward structure. They

are destitute of teeth, lips, external ears, and scrotum: they differ also in many parts of their internal conformation; having no epiglottis, no diaphragm, nor urinary bladder.

The terms used by naturalists in the description and classification of birds, are peculiarly technical and obscure: they are chiefly employed in discriminating these three parts; the head, the body and the limbs: (*caput, truncus et artus*). Almost every peculiarity in the external structure of birds is adapted to the element which they inhabit, and conducive to swiftness of motion. To facilitate their passage through the air, the body in the fore part is sharp, beginning with a pointed bill, and thickening by a gradual swell along the head and neck, till it reaches its greatest bulk; then falling off, and terminating in an expansive tail. The body itself is slender, containing a cavity for respiration, much larger in proportion than that of other animals; a circumstance which contributes greatly to their lightness; as does also the thin and porous nature of their bones, which are much lighter than those of quadrupeds of the same size, and are filled with air instead of with marrow, and in many instances directly communicate with the lungs.

The feathers, that covering which nature has provided for this class of the animal kingdom, are wonderfully adapted to the purposes intended; security, warmth, and celerity of motion. They are divided by naturalists into the down, the smaller feathers, and the quills, (*floccæ, plumæ, et pennæ*). The former are nearest the skin, and in high latitudes are a necessary protection against cold, or wet. The floccæ are soft, short, and unconnected; and are most abundant in the aquatic tribes, particularly in those of the duck kind. Those feathers which cover the body, and are properly the plumage of the bird, have small shafts, and large vanes; and are never exerted or relaxed, unless in anger, fright, or illness. They are all placed so as to cover one another like tiles, permitting the water to run off, while they exclude the cold.

The strongest feathers or quills are placed in those parts of the body where they have most duty to perform. They have large shafts, hollow at the lower end, but filled at the upper with a pith, convex above, and concave beneath, which serves to give nourishment to the vanes on each side. These vanes are broad on the one side, and narrow on the other; each consisting of a number of thin laminæ; stiff, and of the nature of a split quill. The different laminæ are braced together by the elegant contrivance of a multitude of small bristles: those on the one side being hooked, and the other strait, they lock into each other, and keep the vanes smooth, compact, and strong. The vanes being thus adjusted, and the feathers lying close by each other, when spread, no part of them can miss its impulse upon the air.

As the slender substance of feathers is apt to be discomposed by accident, or the excessive heat or moisture of the atmosphere, nature has made an extraordinary provision for their adjustment and preservation in a proper temperament. The animal is furnished with a gland behind, which secretes a proper quantity of oil, that can be pressed out by the bird's bill, and laid smoothly over every feather which requires to be dressed. This gland is situated on the rump, and furnished with an opening or excretory duct, about which grows a small tuft of feathers, somewhat like a painter's pencil. When, therefore, the feathers are shattered or rumpled, the bird turning its head backward, with the bill catches hold of the gland, and pressing it, forces out the oily substance, with which it anoints the disjointed parts of the feathers; and drawing them out with great assiduity, recomposes and places them in due order, by which they unite more closely together. Such poultry, however, as live for the most part under cover, are not furnished with so large a stock of this fluid as those birds that reside in the open air. The feathers of a hen, for instance, are pervious to every shower; on the contrary, swans, geese, ducks, and all such as nature has directed to live upon the water, have their feathers dressed with oil from the first day of their leaving the shell. Thus, their stock of fluid is equal to the necessity of its consumption. Their very flesh contracts a flavour from it, which renders it in some kinds so rancid as to make them utterly unfit for food; however, though it injures the flesh, it improves the feathers for all the domestic purposes to which they are usually converted.

Next to the feathers, we are to consider the other parts that have been reckoned descriptive of the generic characters of birds. The marks derived from plumage are precarious indications of the species to which birds belong: the more important characters of them are all taken by Linnéus from the unfeathered parts; as the beak, caruncles, nostrils, and feet: and in this principle which he has adopted with regard to arrangement, he has been deservedly followed by many other naturalists.

The bill in all birds consists of two mandibles; the upper and the lower. The former is uniformly fixed, except in the genus of parrots, which nature has endowed with the power of moving the upper mandible at pleasure, to assist it in climbing. None of the feathered race have teeth; some indeed have the mandibles sawed or serrated, as the toucans and merganser; but these serræ are not immersed in sockets. In falcons, the base of the beak or rostrum is covered with skin, called the *cere*: in the turkeys it is overspread with a carneous appendage. The nostrils of birds are generally of an oval form, placed near the base of the upper mandible; the organ of smell in gannets is said to be altogether wanting; but in most kinds it is peculiarly acute.

The wings of birds, though not much considered in their classification, are by far their most conspicuous instrument of motion; and in every genus, except the struthious, they are adapted for flight, which is accomplished chiefly by means of the flag-feathers, called *remiges*. The largest of these denominated primary, are situated on the extremity of the wing, and are generally eight or ten in number; the secondary are placed nearer to the body of the animal; are always shorter, and commonly of a different shape and colour. Two species of pinguins are destitute of these flag-feathers; with whom the wings perform the office of fins, in swimming and diving. The larger feathers of the tail, naturalists have termed rectrices, from their being the director or rudder of the animal in flight; for, besides serving to counterbalance the foreparts, they enable the bird to rise, descend, or turn at pleasure. They seldom exceed ten or twelve, except in the ducks and geese, where they are more numerous.

Birds differ remarkably in the form of their feet, according to their manner of life. The feet

have obtained various technical names, as they seemed fitted for perching, walking, running, swimming, or diving. For the first of these purposes, those seem best adapted which have three toes on the anterior part of the foot, and one backward, with the two outward toes partly connected by a membrane: among the walkers this membrane is not to be found. The natatory birds have their feet either wholly palmated, or pinnated, as in coots and grebes, or semi-palmated, as in the American spoon-bill. The parrots, woodpeckers, and other tribes addicted to climbing, have two toes forwards and two backwards. The ostrich, the swiftest of all running birds, or running animals, is in this respect anomalous, having only two toes.

All the external parts of birds appear to be formed for rapidity of motion in that element they are destined to inhabit; all contribute to facility of escape; the shape and lightness of the body, its covering of feathers, the large size of the wings, and the force of those muscles by which they are moved. From the combined operation of these qualities, their swiftness far exceeds that of the rein-deer, or horse, the fleetest among quadrupeds. Thirty leagues in one day, according to M. Buffon, is the utmost either can travel; whereas an hawk or an eagle, he asserts, can traverse a space of two hundred leagues in ten hours; and in support of this, he relates the story from sir Edmund Scot, of the hawk sent from the Canaries to the duke of Lerma, which returned from Andalusia to the island of Teneriffe in sixteen hours, a space of two hundred and fifty leagues.

When we proceed to examine the structure of the organs of sight, we find that they are no less adapted to the purpose of celerity. In all birds, except the nocturnal ones, the head is smaller in proportion to the body than that of quadrupeds; their eyes too are more flat and depressed, that they may more easily divide the air and make way for the body. In comparing the sense of sight in this class with that of quadrupeds, it is found more quick, distinct, and extensive; and the apparent exception of owls, is rather a confirmation of this fact, as the dimness of their sight arises from the extreme sensibility of the organ. The eyes of fowls seem indeed more industriously laboured by the hand of nature than those of all other animals. Though outwardly they appear small, yet both taken together they are larger than the brain; whereas the orbit of the human eye is not the twentieth part of the brain. Anatomists have, besides, observed a particular expansion of the optic nerve in this organ of birds, which renders the impressions of external objects more vivid and distinct. To protect the eye, and perhaps moderate its extreme sensibility, it is possessed of a nictitating membrane, with which it can instantaneously cover the pupil of the eye, when the eye-lids are open.

From such a structure of the eye, the sense of seeing in birds is greatly superior to that of other animals. Nature having destined them for rapid motion, has wisely provided for their safety, by the acuteness of that sense which directs it. To the same velocity of movement had we joined dullness of sight, these qualities would have been contrary and incompatible; had the animal availed itself of the former, it must have been dashed to pieces by unforeseen resistances from the imperfection of the latter. Add to this, that acuteness of sight seems necessary for procuring the animal's support: an hawk, accordingly, from a height in the sky, at which it is scarcely perceptible by the human eye, perceives a lark upon the ground, and darts upon it with unerring precision.

It hath been already observed, that all birds want the lobe of the external ear; but they are furnished indeed with apertures which convey sounds into the auditory canal. Their sense of hearing is indeed very acute, as may be conceived from their power of song, and of modulating the voice, and from the readiness with which they repeat sounds, and learn to pronounce words. This faculty the bounty of nature has conferred upon them as an additional mean of security: surrounded as they are by man, and other tribes of hostile animals, their safety greatly depends, while in darkness, or amidst the thick groves, on being duly apprised of their approach by the quickness and sensibility of this organ.

Buffon is of opinion, that several of the quadrupeds are superior to birds in the sense of smelling: in many of the latter, however, it is extremely delicate and acute. The raven and the vulture wind their prey at an immense distance, and perhaps surpass the dog or the fox: nor are we to imagine that those birds who have no external aperture in the bill are altogether deprived of this sense, which may be communicated by the Eustachian tube that opens into the effluvia at the mouth. It is remarked by Goldsmith, that in decoys where ducks are caught, the men who attend them universally keep a burning turf near their mouths, lest the fowl should smell their breath, and consequently fly away. The universality of this practice puts the necessity of it beyond a doubt, and proves the extreme delicacy of the sense of smelling in this species of the feathered creation.

Notwithstanding this perfection of their senses, birds fall as far short of quadrupeds in sagacity and intelligence, as they are distinguished by these particulars above insects and fishes, the ranks of animated beings immediately below them. Shy in their nature, and jealous of their liberty, most of them avoid the haunts of man; and with too much justice view him as their tyrant or destroyer. Even those which we call domestic, are much less susceptible of sentiments of attachment or obedience than our other servants of the animal race. They render us no service during their lives, and only become useful by their death; they are victims which we multiply without trouble, and sacrifice without pity or regret. Some of them we educate for the chace, and teach to carry their game; others we so far tame as to render them familiar; and by the force of habit almost make them attached to their prisons; but all these sentiments are slight and delible, compared with those which we can transfer to quadrupeds. What comparison is there between the attachment of a dog, and the familiarity of a parrot; or between the intelligence of an elephant, and that of an ostrich?

There is one instance, indeed, in which they discover an astonishing docility, and seem to surpass that degree of intelligence which nature has allotted to their order; and that is, their faculty of imitating and repeating sounds. Though we suspend our belief of the great musical talents which some are said to have acquired by education, we find many well attested instances of a delicate ear in some birds no way remarkable for

vocal execution. Madame Piozzi relates of a tame pigeon, that it answered by gesticulation to every note of the harpsichord. As often as she began to play, it hurried to the concert with marks of rapturous delight. A false note produced in the animal evident tokens of displeasure; if frequently repeated, it lost all temper, and tore her hands. In some birds the ear is sufficiently delicate and precise to enable them to catch and retain a continued series of sounds, and even of words: hence proceed their musical powers; hence, too, their faculty of speaking. Of the parrot we have heard narrated many wonderful exertions of eloquence, which rather tend to evince the surprise of mankind at the docility of an animal so insipid, than to prove any real attainment. He receives words, without understanding them; his voice, by its flexibility, enables him to repeat them; but he gives them back as he received them: he articulates, but does not speak; for with him articulation does not proceed from thought, the principle of speech; it is merely an imitation, which represent nothing of what passes within the animal, nor expresses any of his affections.

When we consider the voice of birds, independent of the influence of man, and separate what is acquired from what is natural; when we observe them in their wild and free state, we perceive that the voice is not only modified by their affections, but that it is renewed, strengthened, changed, or extinguished, according to these, and the temperature of the season. As the voice of all their faculties is most easy, and least troublesome in its exercise, they ply it with a frequency that seems to border on excess; nor is it the females, as we might believe, that are most remarkable for the abuse of this organ; since among birds they are more grave and silent than the males. Like the cattle, they utter cries of fear or of sorrow; they express solicitude and concern for their young; but to the far greater number, nature seems to have denied the gift of song. The singing of the feathered race seems to be the expression of their happiness, and of their soft and agreeable emotions; by these circumstances it is produced; with these it varies; and when they cease, it is extinguished. The nightingale, on his first arrival in spring, begins not yet to sing: he is silent till he has found a mate; and his song at first is short, hesitating, and unfrequent; he ventures not a full, loud, and well supported note, till he sees his female charged with the fruits of his love. During the whole period of nestling, laying, and incubation, he grows more and more assiduous in his caresses, and endeavours to relieve her cares by every charm of song. What proves the voice of this bird to be solely the expression of love is, that with that passion it ceases. The female has no sooner begun to hatch, than she ceases to sing; and towards the end of June the male becomes silent also, or expresses himself in a harsh and frightful croaking note, more resembling the noise of a frog, than his former melodious strains.

Every species of bird is not equally eloquent; some are copious and fluent in their utterance, while others are confined to a few important sounds: no bird, like the fish kind, is quite mute; but some are rather silent. The notes of the rapacious, are shrill and piercing; and in the season of nidification, much diversified. Ravens, beside their loud croak, can utter a deep and hollow note, that makes the woods to echo. Doves coo in an amorous and mournful manner, and are emblems of despairing lovers. All the passarine tribes express their complacency by sweet modulations, and various melody. Aquatic and gregarious birds, especially such as shift their quarters in the dark, are very noisy and loquacious: their perpetual clamour prevents them from dispersing and losing their companions.

No birds possess greater variety of expression, or a more copious language, than our common poultry. Of all the occurrences of their life, that of laying seems to be the most important; for no sooner has a hen disburdened herself, than she rushes forth with a clamorous kind of joy, which the cock and the rest of his mistresses immediately adopt. The tumult catches from yard to yard, and spreads to every homestead within hearing, till at last the whole village is in an uproar. As soon as the hen becomes a mother, her new relation demands a new language: she then runs clocking and screaming about; and seems agitated, as if possessed. The father of the flock has also a considerable vocabulary; if a bird of prey pass over, with a warning voice, he bids his family beware. The gallant chanticler has, at command, his amorous phrases, and his terms of defiance; but the sound by which he is best known, is his crowing; by this, he has in all ages been distinguished as the countryman's clock or larum, as the watchman that proclaims the divisions of the night.

Some of the gaudy birds, and particularly the peacock, have notes peculiarly grating and shocking to the ear; the yelling of cats, or the braying of an ass, is not more disgustful. And of birds in general, it may be observed, that from the structure of their throat and lungs, their voice is much more loud and piercing than that of quadrupeds. The screams of a peacock are heard at a greater distance than the bellowing of an ox, although it is hardly the fiftieth part of the size.

Section III.—*Flight, Plumage, and Migration.*

It is remarked by a skilful naturalist, that to be a complete ornithologist, one should be able to distinguish birds by their air, as well as by their colours and shape; on the ground as well as on the wing, and in the bush as well as in the hand. For though it cannot be said that every species of birds has a manner peculiar to itself; yet there is somewhat, in most genera at least, that at first sight discriminates them. Put a bird in motion, and the judicious observer can pronounce upon it with certainty,

Nam vera incessu patuit.

Thus the kites and buzzards sail round in circles, with wings expanded, and motionless; and it is from their gliding manner that the former, in the north of Britain, has obtained the name of gleads. There is a peculiarity in ravens, that must strike the most incurious observer; they spend all their leisure time in diving and cuffing at each other on the wing in a playful manner; and, when they move from one place to another, frequently turn on their backs with a loud croak, as if about to fall to the ground. When this accident happens, they are scratching themselves with one foot, and thus lose their centre of gravity. Parrots, like all other hook-clawed birds, walk awkwardly, and make use of their bill as a third foot, climbing and descending with ridiculous caution. All the order of gallinæ (poultry) parade and walk gracefully, and run swiftly; they fly, however, with difficulty, and in a straight line, with an impetuous noise. Most of the small birds fly by jerks, or hop when on the ground. The

skylark rises and falls perpendicularly while it sings; the woodlark hangs poised in the air; and the titlark rises and falls in large curves, and is melodious only while descending.

Several observations worthy the notice of the naturalist are obtained from the flight of birds, and their uniform appearance in particular places at stated seasons. A considerable part of the superstitions in the polytheism of ancient Greece and Rome had no other foundation than the accidental flights of birds, or their manner of taking their food. A great body of their priests were called haruspices, from their being employed in watching the motions of these animals. An enterprise was deemed auspicious, or the contrary, according as their motions were reported favourable, or otherwise.

But superstition apart, the experienced sailor derives information from the flight of birds, in which he is deeply interested. The man-of-war bird has a very different flight at sea, from what it has when near the land: in the former case, it soars high in the regions of the air, and its motion is slow; in the latter, it flies much quicker, and nearer to the surface of the water. Hence sailors, by observing its manner of flight, can conjecture pretty nearly their distance from land. The phaeton ætherius is another bird whose appearance is useful to navigators. It is always found within the tropics, never venturing to the north or south of either; whenever, therefore, this bird is observed, the seamen are with certainty informed of their being in an intra-tropical latitude. There is also a bird of a peculiar nature found always within a short distance of the Cape of Good Hope, and hence called procellaria Capensis. As the appearance of this bird indicates to the sailor his approach to the Cape, it is often useful to Indiamen in doubling that promontory. As often as the procellaria pelagica approaches a ship, and gets into the wake, the sailor, by constant observation, finds that he is invariably overtaken by a storm. This fowl is called by the English the petterel; but from its being thus a bird of bad omen, the mariners have denominated it the devil's chicken.

In the northern parts of Scotland, the people employed in the herring fishery are often indebted to the larus parasiticus, and the solan geese, for discovering the shoals of fishes. The birds that feed upon herrings are indeed the surest guides of the fisherman; both are engaged in the same employment; both are in quest of the same object. Nature, however, to compensate for the want of reason, has endowed the former with means of attaining their end, much more certain and efficacious than the lords of the creation can command, after all their boasted improvements in science and arts.

From the appearance of birds in this island, of the interior and more northerly regions of the world, we judge of the severity of the winter, and intenseness of the frost. When swans and snowflecks abound in the north of Scotland, they are deemed the infallible predictors of a great storm. The woodcock too, and fieldfare, are the regular harbingers of winter; while the cuckoo and the rail never fail to announce the approach of summer.

From their food, their manner of life, and their loco-motive powers, birds seem destined to become inhabitants of every part of the globe. The cold and barren regions of the north, and the sultry deserts of the warmer latitudes, have equally a share in supporting the feathered tribes; and in some instances, these distant climes become alternately the residence of the same bird at different seasons of the year. Some dwell with man, and seem proud of becoming tenants under the same roof with their superiors, as the swallow, the jackdaw, and the sparrow. The rapacious birds, of a more shy and independent spirit, are happy in being far from his haunts; and hence choose their residence in high rocks. others are of an alpine nature, inhabiting the lofty mountains, as the snowfleck and ringrouzel. The bustard and the grouse prefer extensive fields The whole order of passeres delight in thick groves, which they enliven by their melodious strains.

The various regions which birds inhabit, subject them to the different extremes of cold and heat; and very remarkable effects are produced on their external characters by both. Almost all the birds of the warm climates dazzle the eye with their strong and vivid colours; in the temperate regions, their tints are more faint and shaded, and less distinguished, either by their brilliance or variety. Of the various kinds which our country produces, few are remarkable for the richness or luxuriancy of their plumage; and of these few, the common cock and peacock are natives of Asia Among our quadrupeds the same mediocrity of colouring is observable; while nature has adorned the animals of both classes throughout the warmer regions of America, Africa, and the Indies, with the utmost splendour and variety of dress: on them she seems to have exerted the whole powers of her pencil. It may be laid down, therefore, that heat exalts the colours of plumage, and renders them at once more vivid and beautiful: and, on the contrary, that cold deprives birds of those ornaments, and diminishes the brightness of their colour. As we proceed northward, the changes are always from brown to white, and never from white to any other colour. White animals and white birds are always most abundant near the arctic regions. It has been observed by some writers, that all those tropical birds, the lustre of whose plumage is so dazzling, possess a harsh and discordant voice, with scarcely any inflections; this idea, however, seems carried too far; for though musical birds are more rare in the warm latitudes, yet their woods are not destitute of songsters, nor their thickets of harmony.

The male and female in most species of birds vary very considerably in colour; the former is generally arrayed in the more gaudy dress than his mate, and differs from her so much, that it is probable that the greater part of ornithologists have been deceived by this circumstance, and have multiplied the number of their species, by describing them double. It is to be presumed also, that varieties of the same family have been arranged as distinct species.

The colour of birds, from a multitude of causes, is changeable, and hence ought seldom to be admitted as a characteristic mark of the distinct species. It is found, that the colour of all birds is influenced, in some degree, by age: in some it varies according to the season, and in many more according to climate. At an advanced period of life, it has been alleged that the females of some genera apparently change their sex, and assume a plumage characteristic of the male. Something indeed analogous to this is discernible among the human species, in those copious beards that are seen on some old women after the period of fecundity. The snowfleck is an example of the influence of season upon colour. And those numberless birds of the arctic regions perfectly white, among which no such

whiteness prevails after their appearance in more temperate climes, serve to illustrate the powerful effects of climate, with regard to this particular.

From the flight and plumage of birds, we next proceed to examine their migrations from one country to another at different seasons of the year. There is no circumstance in their history which has more engaged the attention of naturalists than this; and there is, perhaps, none in which they have been less successful. In order to guide us through this dark research, we shall divide birds into such as are stationary, migratory passengers or wanderers. The first class comprehends a great number of our land birds; which, though they have so much to fear from man, and from each other, are seldom driven away from their accustomed haunts, notwithstanding that they are perfectly fitted for a wandering life; and though, by the ease and rapidity with which they can change their place, they are enabled to accomplish their desire, however distant the object; yet a great number remain contented in the districts where they were bred, and seem to confine the gratification of their appetites greatly within the limits of their endowments. The eagle, the crow, the rook, and the sparrow, if undisturbed, never leave their native haunts. The blackbird still frequents its wonted hedge; and the red-breast adheres to a certain district, from which he seldom moves, and, mild as he seems to be, expels from his territory all that are inferior in strength or courage, without distinction, and without pity.

The powerful calls of nature, however, drive many birds annually from their native country in quest of food, of a warmer climate, or of a secure asylum, while employed in hatching and rearing their young. It was formerly believed, that the changes of heat and cold were the causes of the migrations of birds; it is more probable, however, that those daring and adventurous journies which might even intimidate human perseverance, are occasioned by a scarcity of food, or by the want of a secure resting-place, during incubation, from the persecution of man. In general, our summer birds of the migratory kind come from the south; while those that remain with us during the winter months can almost all be traced to the colder regions of Norwegian, Swedish, and Russian Lapland.

We are informed by Linnéus, that Lapland abounds, during summer, with enormous quantities of insects; and this is more or less the case with all the north of Europe. The insectiverous birds, therefore, such as the cuckoo, goatsucker, and all the tribes of swallows, during the warm months, are there abundantly supplied; but on the close of that season, when their favourite food begins to fail, they regularly depart for the milder climes of the south. Among the quails and the storks, this seems a preconcerted undertaking. They assemble together for some days before their departure; take different short flights, as if to train their young for the journey; and by an odd kind of chattering, seem to debate upon the plan of their route. When these preliminaries are settled, they all take their flight in a body, that they may more easily oppose their enemies; they often appear in such numbers, that to the mariner at sea, they resemble a cloud resting upon the horizon. The boldest, strongest, and by far the greatest number, probably make good their intention; but many there are, that, not apprised of their own want of force for the arduous undertaking, grow weary in the way, and, quite spent by the fatigues of their flight, drop down into the sea, or fall upon the decks of ships, and thus become a prey to the sailors, or to the waves. The summer birds of our country are the different species of swallows, the rail, lapwing, goat-sucker, ring-ouzel, and green plover. It is far from being exactly ascertained where each of these genera retires during winter; but it is probable the larger number resort to Africa, or to the more southern latitudes of Europe.

With regard to the winter birds, which migrate from us in summer, the most remarkable are the woodcock, the fieldfare, the red-wing, and snowfleck. Of the first genus, the greater part seems to make an annual voyage to Britain and Ireland from America. On the western shores of these islands, they are far more numerous than on the eastern; and on the west of Ireland, they are in the proportion of ten to one to those found on the coast of Britain. After their long flight across the Atlantic, they are so much exhausted, that they are frequently caught with the hand on their first arrival. In farther confirmation of this opinion, woodcocks are known to breed in great numbers in Canada and Cape Breton, during summer; they leave both countries in the month of September, and return again in Spring, nearly at the period they are found to desert Britain. To this we may add the observations of sailors, who have actually seen them at sea passing from the west, towards land on the coast of England, during the fall. It is not improbable that some of the woodcocks on the east coast may come from the North of Europe. They breed in Norway and Russia, and no doubt may migrate to our own shores during winter. All the rest of our winter birds, we know, are natives of these northern countries: the woodcock alone is from the west, and its migrations have this farther peculiarity of being solitary, and not in flocks, like the storks and swallows.

Among the winter birds of Britain, we must also rank that vast quantity of water-fowl that frequents our shores: of these, it is surprising how few are known to breed here. The cause that principally urges them to their long journies into the northern regions, seems to be not merely the want of food in this country, but the desire of a secure retreat. Our island is too populous for birds so shy and timid as the greatest number of these are. When much of the country was a mere waste, an uncultivated tract of woods or fens, many species of birds which now migrate probably remained with us in security throughout the year. The great heron, and the crane, that have now forsaken this country, are said to have bred familiarly in our marshes, and by their numbers to have peopled our fens. Their nests, like those of most cloven-footed water-fowl, were built on the ground, and exposed to every invader: as rural economy increased, these animals were more and more disturbed by the encroachments of the husbandman; till, after a long series of alarms, they have been obliged to seek, during summer, some lonelier habitation, at a greater distance from their tyrants and destroyers.

Of the numerous species of the duck kind, we know of no more than five that breed here; the tame swan and goose, the skeldrake, the eider duck, and a small number of the wild ducks.

The rest contribute in forming that amazing multitude of water-fowl, which annually migrate from the southern parts of Europe to the woods and lakes of the dreary regions of Lapland. There they perform the duties of incubation and nutrition in perfect security; and from these vast and solitary retreats, they issue in September, and disperse over the whole of Europe. There are few of this numerous genus, which, in obedience to the first great dictate of nature, may not be traced flying to the arctic regions, a country of lakes, rivers, swamps, and mountains: there the thick and gloomy forests not only afford them shelter and security, but also, by keeping the ground moist and penetrable, afford the snipe, woodcock, and other slender-billed birds, the means of collecting their food; while the web-footed birds find abundance in the larves of insects, which are there deposited in vast quantities on the waters.

In these places the days are long; and the beautiful meteoric nights afford them every opportunity of collecting so minute a food, which is probably more grateful than any other, and which the all-bountiful Creator has spread for them so redundantly in the wilderness. It is therefore no longer a matter of astonishment, that such vast numbers of fowl should descend from these regions on the approach of winter, numbers which far exceed the army of Xerxes, and which Linnéus observed for eight whole days and nights, to cover the surface of the river Calix, as he proceeded along its banks.

These migrations generally commence in the middle of September, when they quit their retreats to disperse over Europe. The order of their flight is pretty remarkable; they either follow each other in a long line, or march in an angular form, the two lines meeting each other at a sharp point. The bird which leads the van cleaves the air, and facilitates the passage of those that follow: when fatigued in this laborious station, he falls back into one of the side files, and is replaced by another, who leads on the whole body in his place. With us, they make their appearance about the beginning of October; circulate first round our shores; and, when the frost compels them, betake themselves to our lakes and rivers. There are some of the web-footed fowl of hardier constitutions than others; these endure the ordinary winters of the northernmost climates, but when the cold reigns over them with more than common rigour, they repair for shelter to these kingdoms. Hence the divers, the wild swan, the swallow-tailed skeldrake, are not constant visitors; their appearance is regulated by the severity of the winters in their native abodes.

That animals so dull and irrational should be able to accomplish such long journies should know where to direct their course, or when to undertake it, has been a matter of just surprise. It is probable they are guided in this, as in every thing else, by the strong impulses of an instinct under which they seem wholly passive. Their accustomed food no sooner begins to fail, or the climate to be disagreeable, than they meditate a retreat to better accommodations. In migrating birds, the change of residence is a kind of natural want, which manifests itself strongly, even when in a state of captivity. At the two seasons of migration, the quail, although confined, discovers the utmost inquietude; leaves nothing unattempted to procure liberty; and the violence of its efforts to escape often occasions its death. Impelled, then, by so powerful an instinct, it is probable that birds obey its call, without foreseeing the advantages to be gained by a removal, or anticipating the dangers of encountering the winter in the same country. They seem not to have any recollection of those places where they spent former seasons. They cannot possibly survey the countries where they are to take up their abode, from their immense distance, and the rotundity of the globe. They appear to be guided by the climate, rather than the country; and so soon as they find the former suited to their wants, they are determined in their choice of the latter.

The variety of opinions which naturalists have adopted concerning the departure and winter residence of our summer birds, fully evinces the obscurity of this portion of their history. It is universally agreed, that the swallows in every part of Europe regularly disappear before the commencement of winter; and the most general and probable opinion is, that they remove beyond the Mediterranean to the warmer climates of Africa, to spend the winter in a country where they find a continuance of their natural food and a temperature of air suited to their constitutions. In confirmation of this opinion, Mr. Adanson asserts, that during his long residence at Senegal, he constantly observed swallows arriving there about the same time that they leave Europe. They have been frequently seen by sailors alighting on the rigging of ships, to rest themselves during their long passage from the one continent to the other. They are perceived, too, like the quails and storks, to collect together in large flocks for some days before their departure; after which, they regularly disappear.

While the annual migration of the house-swallow seems thus ascertained by facts, observations, and analogy, another opinion has been formed, and with some appearance of evidence, that they pass the winter in a dormant state, in rocks, banks, and even in lakes, at the bottom of the water. This notion has lately been supported by authors of credit and respectability. Some northern naturalists positively assert, from their own knowledge, that they have been dragged in nets from the bottom of lakes, in a torpid state. Mr. Collinson has given the evidence of three gentlemen, eye-witnesses to numbers of sand martins being drawn out of a cliff on the Rhine; and the Hon. Daines Barrington, in his treatise on the migration of birds, asserts, that they do not fly over any large surface of water, but reside under it all the winter in a state of hybernation, or winter-sleep.

Several of our countrymen have given credit to the submersion of swallows. M. Klein patronises the doctrine strongly, and gives the following account of their retreat, which he received from his countrymen. They assert, that the swallows assemble in numbers, on a reed, till broken by their weight, it sinks with them to the bottom; and as a prelude to their immersion, they sing a dirge of a quarter of an hour's length: that many unite in laying hold of a straw with their bills, and thus plunge down in social compact into their subaqueous retreat; that others again form a large mass, by clinging together with their feet, and thus commit themselves to the deep. It is related by Olaus Magnus, archbishop of Upsal, that when the fishermen discover such masses, they bring them to life by thawing the birds at a fire; but owing to

a premature and forced revival, they continue but a short time to enjoy it.

In opposition to this view of the subject, it has been observed by M. Buffon, that the house swallow, at least, is incapable of subsisting in a benumbed or torpid state. Those which he placed in an ice-house uniformly perished, and gave no symptoms of revival on the application of heat. He supposes, however, that there may be some other species of swallow capable of such a state of hybernation. Mr. John Hunter asserts, that in swallows, the organs of respiration are very differently formed from those of the animals that sleep during winter; and he justly condemns the opinion of any terrestrial animal being able to support life for any length of time under water.

Although there are abundance of lakes in Britain, yet there is no well attested instance of swallows having been found in a state of torpor and immersion: till such is found, we are surely excuseable in suspending our belief. What may have given rise to the above opinions is, that there remain annually some bird of later flights, who, unable to bear the fatigues of so long a voyage, have not attempted it, and are found destroyed by the rigours of winter. If their nests have, by any accident, been demolished, they are known to lay a second, and sometimes a third time; not being able to carry off, at the usual term, their tender offspring, rather than abandon them, they prefer suffering with them the inclemency of the season, and certain death.

Besides those birds that remain stationary in the country during the whole year, and those that regularly migrate at particular seasons, there are some that may properly be stiled passengers. By which title is understood, such as are found in a particular country, only for a short time, as they pass from their summer to their winter residence. In North Britain the king's fisher and Bohemian chatterer come under this description. While a fourth class of birds have been denominated wanderers, from their passing alternately from one part of the same country to another, as induced by the weather. The curlew passes the winter in the vicinity of the sea; but in spring repairs regularly to the hilly country, where it passes the summer in incubation, and rearing its young. At the end of summer these birds are seen again repairing in groups of three or four families to their winter quarters upon the shores. Two or three species of gulls also leave the sea, and on the approach of stormy weather take up their abode in the lakes of the interior parts of the country. Those birds that are observed far from land may also be termed wanderers; scarcely a ship crosses the Atlantic, in which the sailors do not see some of them perching upon the rigging: it is to be regretted that men of this calling seldom possess curiosity in a degree proportioned to their opportunity of gratifying it, otherwise the history of birds of passage might have derived much illustration from their remarks.

In the migration of many birds, there are peculiarities worthy of our notice. Some emigrate from a country to which they never again return; and of this we have a remarkable instance in the magpie. It is not above seventy years since a single individual of that species was seen in Ireland. At that period, they seem to have made a partial migration from Scotland; but they are at present as numerous in the former as in the latter country. The same spirit of colonization has been remarked among the wood-larks; some districts of the country being now frequented by them, where they formerly never appeared. It is observable, that some migratory birds leave a country one year, in which they are stationary in another. Thus the common wild duck remains in Sweden during a temperate winter; but emigrates in a severe one. This arises from a very urgent motive, the want of food; and from the same cause, it is probable, that the wild goose, which in Sweden is only a summer bird, is stationary in the north of Scotland. The sky-lark is permanent the whole year in Scotland, although it is a bird of passage in Minorca: in England also, the snipe is migratory, but stationary in Scotland.

Some birds migrate in quest of a particular kind of crop. In Cuba, the rice-bird is found in prodigious numbers during the season of that crop: the rice is no sooner gathered, than it removes to Carolina, and meets the harvest in that country, where it in like manner remains till the rice season is past. It is to be remarked also of this and several other species of birds, that the male and female separate during the time of migration. Of the rice-bird, we are informed, that it is only the females that migrate to Carolina. In Sweden, a species of duck also is found, of which the males leave the country at the time of incubation, and do not return till the pairing season. A farther peculiarity in some migratory birds, is their observing a different route while going to winter quarters, from that by which they return. The only certain example of this is the pigeon of passage in North America. In its course from Canada to Carolina, the former of which is its seat of breeding, it perches upon the trees in Virginia during the night. Many of the branches are found broken to the ground by the weight of the immense multitudes that light upon them; a circumstance which marks their route to the people of the interior country, who support themselves by killing them. By this means their progress may be traced with great facility from morning till night, during their whole journey; but in their return to Canada, in spring, their track is altogether unknown.

SECTION IV. *Food, Longevity, Diseases, and Fertility.*

When we compare birds with quadrupeds there are many circumstances with regard to their subsistence, in which they strikingly resemble each other: the different kinds of food destined to be the support of the various tribes of both classes of animated beings, points out a strong analogy, and impresses the mind with an idea of the uniformity of the general plan of nature. There are among birds, as among quadrupeds, some that are carnivorous; and others, whose food consists of fruits, grain, insects, or vegetables. The same physical cause which produces in some quadrupeds the necessity of devouring flesh, and other strongly nutritive food, subsists also among birds. The carnivorous tribes in both have but one stomach; and the whole of their intestines are formed on a smaller scale, than in those whose nourishment is grain or fruit. The crop in granivorous birds, and the paunch which corresponds to it in ruminating animals, are generally wanting in the rapacious kinds: by the largeness of this instrument of digestion, the former are capable of swallowing a much greater quantity of food, and can thus compensate for the plainness and simplicity of its quality.

The disposition and habits of all animals are

strongly influenced by their manner of subsisting, and the nature of their food: among birds, there is observable the same variety as in quadrupeds, for in both, the causes of it are similar. The noble and generous eagle ranks among the former, as the lion among the latter: while the cruel and insatiable vulture seems to correspond with the tyger in savage rapacity. The kites, the buzzards, and the ravens, are the hyœnas, wolves, and jackals of birds; while the peacocks, turkeys, and all the gallinaceous tribes, represent the oxen, sheep, goats, and other ruminating quadrupeds: the manners of the latter are more mild and gentle than those of the rapacious kinds, and their flesh more salubrious and palatable.

It appears, however, that the food of birds is, upon the whole, more various than that of quadrupeds; and that each species is less confined in its choice. Nature seems to have consigned to them for food every animal, and every vegetable; among the former are comprehended a great variety of insects and reptiles, which quadrupeds generally disdain. As their sense of taste is far from being delicate, they frequently supply the deficiency of one kind of food by another; the hen and the turkey almost indiscriminately devour flesh and grain. Their organs of taste are cartilaginous, and possess hardly any sensibility; their food is instantly swallowed without mastication. From these circumstances, it sometimes happens, that instead of nourishment, they devour poison. Hence the attempts of Frisch and some naturalists to arrange birds according to the nature of their food have proved equally unsuccessful and injudicious: never can we ascertain the nature of any animal by a single habit alone; the more numerous the characters that are selected for its discrimination, the less imperfection will be found in its arrangement.

As birds want the power of masticating their food, the formation of the stomach of the granivorous orders is admirably contrived to supply such deficiency. That office, which in quadrupeds is performed by the teeth, is in them transferred to the gizzard; which, by its strong muscular texture, is capable of being so forcibly contracted as completely to grind the hardest grain. This power of the gizzard is augmented by means of small pebbles which the bird swallows along with its food; when aided by these, and still farther assisted by the gastric juice, the most rigid substances, even metals themselves, are corroded, and unable to resist its force. Pieces of coin have been introduced into the stomachs of birds, it has been uniformly found that their weight is considerably diminished, after being exposed to this double action.

As birds are destined to move through the light medium of the air, they are far inferior both in weight and magnitude to the quadrupeds; the largest bird, the ostrich, bears no proportion to the elephant; nor does the humming bird, which nature has placed at the other extremity of this class, nearly approach to the size of a mouse. Nature, as she approximates the confines of each class, confers more and more of the properties of the adjoining one on each species till at last they so nearly unite that it is often doubtful to what species an individual belongs. The ostrich, placed at the extremity of the birds, seems in many respects nearly allied to a superior class: seemingly covered with hair, and incapable of flight, he makes a near approach to the race of quadrupeds; while the small humming bird, of the size of an humble bee, and sucking like it the nectaria of flowers, seems to be degraded nearly to the rank of an insect.

From the diminutive size and slender conformation of birds we might be led to suppose, that the duration of their life would prove but short; the reverse, however, of this is the case: their longevity far exceeds that of quadrupeds, and even of man himself; and it seems neither to observe the same proportions, nor to be guided by the same rules. In these animals the duration of life bears a certain proportion to the period at which they arrive at their full growth and maturity; nor are they capable of procreation till their size is nearly completed. In birds the growth is more quick, and the period of procreation much earlier; many of them run as soon as they are excluded from the shell, and fly at the end of four or five weeks: a cock is capable of procreation at six months, and arrives at maturity in a year: if then the duration of human life and that of quadrupeds be only six or seven times longer than the period at which they arrive at maturity, a cock should live only six or seven years; his longevity, however, is far greater, some being known to live upwards of twenty years. A linnet has been known to live fourteen years; bulfinches twenty; parrots are said to live forty years; geese fourscore: of swans, eagles, and ravens, there are various reports; some have asserted, that they lived one hundred years, others double, and even three times that period; but of this there are few well attested examples.

The longevity of birds, M. Buffon imputes to the texture of their bones; the hardness and solidity of which, he assigns as the general cause of death in all animals: those of birds being lighter and more porous in their conformation, present fewer obstacles to the vital powers; and nature thus finding more room for the functions of life, carries it on to a more distant period. The less solid the bones are, the more distant, he alleges, will be the period of death; hence, a greater number of women than men arrive at extreme old age.

From the extraordinary longevity of birds, it is probable they are subject to few diseases; their annual molting, if it can be considered as a disease, is perhaps the only one to which they are universally liable. As quadrupeds cast their hair, so all birds every year obtain a new covering of feathers; and it is this which is termed molting. During its continuance they always appear sickly and disordered; the boldest lose their courage; none produce young, and many die under so severe an operation. No feeding can maintain their strength, or preserve their powers of reproduction. A hen, however plentifully fed, will then cease to lay; the nourishment which formerly went to the production of young is now consumed and absorbed in administering a supply to the growing plumage.

The molting of birds, even when left to the operation of nature, is a severe malady; its fatal effects, however, have been greatly increased by the interference of man, in endeavouring to bestow artificial accomplishments on those birds which he reduces into captivity for the sake of the beauty of their colours, or the melody of their song. The bird-catchers in the vicinity of London, whose employment consists chiefly in gratifying the whimsical and capricious, have invented a method of accelerating the season of molting, by which it is pretended that birds are improved both in their song

and beauty. To effect this, they shut them up in a dark cage, closely wrapt up with woollen cloth, allowing their dung to remain and increase the heat of the cage. In this state of confinement, which continues for a month, they are only now and then supplied with water, the putrid air, and the fever which it occasions, depriving them of all appetite for food.' By this violent operation, which is termed stopping, an artificial and premature molt is produced, at the expence of the lives of many of the ill-fated creatures who are subjected to so unnatural a regimen. The price of a stopped bird rises in proportion to the danger attending it; for it is pretended that its note is not only louder and more piercing than that of a wild one, but that its plumage is also more vivid and beautiful. In short, that there is as much difference between a wild and a stopped bird, as between a horse kept in body clothes, and one at grass.

The manner in which nature performs this operation, as it is slower in its progress, so it is less frequently attended by the same fatal consequences. When the feathers of birds have attained their full size, the pen part nearest the animal grows harder and thicker in its sides, but shrinks in its diameter; in consequence of the first of these processes, it draws gradually less nourishment from the body of the animal; and by its decrease in size, it grows more loose in the socket, till at length it falls off. In the mean time, the rudiments of an insipient quill are rearing below: the skin formed into a little bag which is fed from the body by a small vein and artery, and which every day increases in size till it is protruded. While the one end vegetates into the beard or vane of the feather, that part attached to the skin is still soft, and receives a constant supply of nourishment, which is diffused through the body of the quill by the artery and vein. When, however, the quill is come to its full growth, and requires no farther nourishment, the vein and artery become gradually less, till at last the small opening by which they communicated with the quill is stopped, and the circulation ceases. The quill, after it is thus deprived of new supplies, continues for some months in the socket, till at last it shrinks, and makes room for another repetition of the same process of nature.

The molting season commences at the end of summer, and the bird continues to struggle under the malady for a considerable part of the winter; thus, by the wise appointment of nature, the appetite of the animal is least craving, while its provisions continue to be most scanty. It is not till the return of spring, when the feathers have attained their full growth, that the abundance of food, and the mildness of the season, restore it to its full vigour. It is then, when every vegetable springs afresh, that insects are awakened from their torpid state; and that nature, teeming with an increase of life, seems disposed to continue and transfuse it, by a reproduction of every species of her offspring.

Among the feathered race, accordingly, the return of spring is the beginning of love. Those vital spirits which seemed locked up during winter, begin then to expand; vegetables and insects supply abundance of food; and the bird having more than sufficient for its own nourishment, is impelled to transfuse life, as well as maintain it. The return of the sexual passion among birds is announced by the frequency, loudness, and variety of their notes. Hence M. Buffon concludes, that there is in these animals a strong connection between the sexual function and that of the voice; and that the delightful harmony of the grove so much admired by man, is the natural expression of their loves. The language of the male, in this season of enjoyment, is most loud and copious: to his calls of allurement the female expresses her assent in more feeble and interrupted notes. In quadrupeds the appetite is strong, but the desires arising from it are as fleeting as they are impetuous: while that passion in birds is distinguished by tenderness, attachment, and constancy. Except the gallinaceous, and a few other tribes, birds are all monogamous; and for the season at least, the compact is observed with unbroken fidelity. Among quadrupeds, there are but few instances of conjugal fidelity, and still fewer of parental concern in the males, for their progeny; whereas among birds, examples of the contrary are rare. Nothing can exceed the affection and assiduity of the monogamous birds, but their mutual tenderness and solicitude for the fruits of their love. The female no sooner begins the construction of her nest, than she is assisted by her fond mate: their mutual labour produces a mutual attachment, which is strengthened and confirmed by succeeding toils and multiplied cares. During the whole period of incubation, the male carries food for his female, or soothes her by his song; sometimes he even supplies her place in her absence, or joins her in the nest to increase the heat, and share the fatigues of her situation. But the pleasures of love appear dull in their effects, when compared with the force of those attachments which commence after the exclusion of the young. Their birth seems a new sort of transport, and a fresh bond of union; their maintenance and protection is another employment requiring the joint efforts of both parents. Thus far the manners of birds represent what takes place in every worthy family; mutual love and parental affection; and these aerial beings whom nature seems to have produced in sportive mood, may, nevertheless, be regarded as a sober and virtuous race, from whom we may derive moral instruction, and an useful example.

This conjugal fidelity, so remarkable among birds, seems to arise from the necessity of both male and female co-operating in building their nest, and providing for their young. It is only found to prevail in the woods and fields, where nature is allowed to remain in unadulterated simplicity: wherever man interferes, he influences and changes the strongest propensities of their nature. The poultry in our yards, who are exempted from the labour of building a nest, and of providing for their security and sustenance, either indulge in promiscuous association, or are distinguished by the slightness of their attachments, and the inconstancy of their love. The females among them have the whole charge of rearing and protecting the young; an office for which they are well qualified by the tender solicitude which they display, and that courage bordering on fury, by which they are at that season animated.

In general, birds possess a much greater degree of fertility than quadrupeds. Weak and defenceless as they are, and surrounded by a thousand enemies, they are liable to so many accidents, that without this wise provision of nature, the

whole race must have inevitably been extinguished. Those birds also which are most useful, or easily destroyed, are always most distinguished by their fertility. While the eagle, and some of the rapacious birds, lay only from two to four eggs, the grous, partridge, and other gallinaceous tribes, whose flesh is palatable, and who are therefore so often made the prey of man, and their own species, lay from nine to eighteen. Thus, the rapacious animals are abridged by sterility; while those that are easily destroyed are as easily repaired; for wherever nature has denied the power of resistance, she has compensated the want by the fertility of procreation. The power of reproduction is greatly increased, and the period of fecundity prolonged among the poultry kind, by domestication. Want, cold, labour, and inquietude, diminish in all animals both the effects and the power of procreation; they are constantly more productive in proportion as they are well fed, and regularly supplied with accommodation. Those that are left in freedom, that are continually exposed to scarcity, fear, and all the inconveniencies of an independent state, appear not to exert to their full extent their power of generation; they seem to husband its effects, and accommodate themselves to the exigencies of their condition. A bird that has completed her usual number of eggs, immediately ceases to lay. All the rest of the season she employs in incubation, and rearing her young. If, however, by any accident, her nest is destroyed, she constructs a second, or even a third, and will lay as often. Duty seems here to controul passion, and attachment to gain the ascendant over love. The common hen, whose eggs are constantly carried away, does not begin to hatch till her productive power is exhausted; and by laying upwards of an hundred eggs in a season, displays the great extent to which the fertility of birds may be carried.

It is probable, that the fertility of all the different birds capable of domestication might be increased by the same means. Our common poultry, in their wild state, are said not to be more prolific than the partridge or pheasant. The abundant nourishment with which we supply them, appears to be converted into the materials of fecundity, and to increase their progeny.

Section V.—*Nestling and Incubation.*

After fecundation, the female begins to lay; but such eggs only as have been impregnated by the male, are prolific; those that have been produced without previous connexion being always addled by incubation: this is said to be almost uniformly the case with one of the two eggs laid by the female eagle. The ovation of birds has been considered as an important part of their history. Klein has published a work on this subject, in which he has delineated the eggs of one hundred and forty different species, coloured so exactly from nature, that they can hardly be distinguished. Sir Ashton Lever made one of the greatest collections of the eggs of birds that has been hitherto known.

The habit of incubation is common to all birds, except, perhaps, the ostrich, cassowary, and cuckoo, the two former of which deposite their eggs in the sand, where they are hatched by the heat of the sun, and the last of which deposits them in the nest of the hedge-sparrow or of some other small bird, and thus leaves the care of her young to foster-parents. Before laying or incubation, all other birds are uniformly directed by instinct to the operation of nestling. Among the monogamous birds who build upon trees, this proves a laborious undertaking, and is accomplished generally by the united endeavours of both sexes. The nidification of birds has been deservedly the subject of much admiration. Among the different orders there is to be found almost every imaginable variety in the situation, structure, and materials of which the nests are composed. Such, however, is the uniformity with which instinct proceeds, that the same species, in all countries, build their nests not only of the same shape, but as far as possible with the same materials. In the red-breast, and some other birds where a small variation in their mode of architecture has been perceived, it has always been found to be the result of necessity. Where oak leaves are found in plenty, the former prefers them; if not, he supplies the want by moss and hair. In general, the structure of the nest is adapted to the number of eggs, the temperature of the climate, and the heat of the animal's body which is to occupy it.

When the bird is of small size, and its eggs are numerous, the nest must be proportionably warm, that they may all equally partake of the vivifying heat. Hence the wren, and many of the smaller birds, construct their little edifices with great care, and with very warm materials; whereas the plover and the eagle, whose eggs are so few, that the body may easily be applied to them, build with no solicitude; some, in these circumstances, leave them upon the naked rocks. The climate has also its influence on the nestling of birds: many of those water-fowl, that with us construct their nests in a careless manner, discover greater solicitude in the colder climes of the north, where they strip the down off their breasts, to line their nests, and protect their progeny.

The situation of the nests of birds seems to depend greatly upon their habits of life, the vicinity of food, and their security from the invasion of their enemies. Some build upon the ground, as the gallinaceous tribes and water-fowl: others build under the ground, as the swallow and puffin; which last becomes the tenant of a rabbit's hole. By far the greater number build in bushes, or on rocks: one species only, that of the water-hen, performs incubation on the surface of the waves, her nest being attached to a few reeds. The larger rapacious birds, who live in perpetual hostility with all nature around them, repair, at the breeding season, to the inaccessible rocks and precipices, where they have least to fear from man, and those numerous tribes of animals with whom they constantly are at war. In the thick and luxurious woods of the warmer climates, where birds have little to fear, but from the serpent or the monkey tribes, some, especially of the gross-beak tribes, build their nests pendulous from the extremity of the branch of a tree. There, where man is seldom their aggressor, they take no pains to conceal them from the eye; their construction is beautiful, and their entrance curiously contrived below, to secure them against the more dangerous invasion of the serpent or monkey tribes. But all those birds who live upon fruits and corn, and are too often unwelcome intruders upon the fruits of human industry, are chiefly solicitous in constructing their nests, to conceal them from the eye of mankind. Informed by experience, with how much severity he checks their

encroachments, they seem, by their extreme precaution, to elude his observation, and to regard him as their most formidable enemy.

The nestling and ovation of the feathered race are no sooner completed, than they enter upon another process equally necessary to perpetuate their kind, but still more tedious and painful. Neither the nature nor extent of the instinct of brutes is fully understood; this principle, however, during the incubation of birds, seems in some respects to approach, if not to surpass, the powers of reason. Nothing can exceed the patience of birds when hatching: during a period which continues from three to eight weeks, neither the approach of danger, nor the calls of hunger, can drive them from the nest. Before incubation is completed the female, however plump at the beginning, is generally emaciated to a skeleton. Among some tribes, the male and female sit alternately, the more equally to divide the tedious labour: among others, the male provides food for his mate, while hatching, or alleviates her toils by his melody from a neighbouring bush; some join together in the arduous operation, and by increasing the heat, endeavour to accelerate its progress. At times, however, the eggs acquire an heat that seems hurtful to infant life: on these occasions they are left to cool; and the hen, after a longer or shorter space, according to the weather, again resumes her occupation, with her former perseverance and pleasure.

Mr. Addison, when speaking of the instinct of birds, terms it an immediate direction of providence, such an operation of the Supreme Being, as that which determines all portions of matter to their proper centre of attraction. It is certain that they seem almost entirely passive under its influence. In obedience to its call, they fly from one appetite to another; and whatever ingenuity they may seem to possess while acting under it, in every thing beyond its reach, they display the utmost dulness, or the greatest stupidity. "With how much seeming caution does an hen provide herself a nest in places unfrequented, and free from disturbance! When she has laid her eggs, so that she can cover them, what care does she take in turning them regularly, that every part may partake of the vital heat! When she leaves them to provide necessary sustenance, how punctually does she return before they have time to cool, and become incapable of producing an animal! When the birth approaches, with how much nicety and attention does she help the chick to break the prison: she covers it from the injuries of the weather; provides it with proper nourishment, and teaches it to help itself!" In all these particulars, her instinct guides her with the caution and exactness of human reason in its nicest and most delicate operations. Yet with all these appearances of sagacity, the hen, in other respects, discovers no glimmerings of thought, nor any shadow of ingenuity. She will please herself with a stone, or a piece of chalk, instead of an egg, and will incubate it in the same manner. She knows not the number she has laid; and allows them to be increased or diminished at pleasure. She cannot distinguish her own eggs from those of another; and she will rear a brood of ducks as carefully as of chickens. When she beholds this supposititious offspring launch into the pool, she stands at the edge of the water, trembling between two contrary impulses of instinct, but obeys the more powerful call of nature, that of self-preservation. When the young are produced, the next object of parental care is their protection and support; and the spirit and industry they display at this period demonstrate how amply nature has qualified them for both. The most timid and inactive become spirited and courageous in defence of their progeny. The rapacious kinds acquire more than usual ferocity. They carry their prey, yet throbbing with life, to the nest, and early accustom their young to habits of cruelty and slaughter. Those of milder natures, equally occupied by the necessary concern of supporting their families, discontinue their singing at this season; every inferior amusement, on the commencement of this great æra of their happiness, is laid aside, when, proud of becoming parents, and rearing a progeny of their own, they seem transported with pleasure.

Of those birds that build on the ground, the greater part of the young are able to run as soon as they are excluded from the shell; all that is necessary for them, is shewing their food, and teaching the manner of collecting it. Those, however, who are hatched upon trees, remain in the nest so long as they continue in an unfledged state. During this period, both parents are commonly employed in providing them a regular supply; with which they are all fed in their turns, one after another, that none may take away the nourishment from the rest. It is not till after their plumage is fully grown, and they are capable of avoiding danger by flight, that the young are led from the nest, and taught to provide for themselves. At first they make only short excursions, while the weather is fine, around the nest, or to those places in its vicinity where food abounds. After they have been for some days taught to discover their food, and carry it away, and have become at length completely qualified to provide for themselves, the old ones lead them no longer back to the nest; but, conducting them to some field where their food is plentiful, forsake them for the last time; and their former intimate connection being no longer necessary, is for ever broken off.

From the longevity of birds, and their fertility in production, we might imagine that they would soon overspread the face of the earth, and overpower the feebler tribes in the great commonwealth of nature. Their numbers, however, are abridged by a thousand accidents; and it is probable that a family seldom adds its whole increase to the general stock of inhabitants. Such only as are hatched early in the spring, are strong and vigorous; while such as have been delayed till after the middle of summer, are feeble and tender. Many of the latter are incapable of sustaining the rigours of winter, and fall a sacrifice to cold and want, against which they are unable to provide. Birds, as if warned of this danger, endeavour to produce their young early in the spring; if, however, their labours have been obstructed by any accident, if their nests have been discovered and plundered, they still persevere in their endeavours to fulfil the purpose of nature, and usher into life a feeble offspring, at a period too late to acquire that vigour necessary to overcome the severity of winter.

After the young of birds have come to that degree of maturity which renders them independent of parental assistance, the various tribes differ remarkably in their appetite for society; some kinds are solitary, and others gregarious. Many birds who live in pairs only during the breeding season, assemble together in large flocks as soon as that period is past. This is remarkably the case with

swans, geese, and ducks; the whole order of passeres also commonly collect into flocks during winter; and in these flocks, birds of different species are often united: they all, however, regularly disperse on the approach of spring, the pairing season. On the other hand, the herons, gannets, and some other tribes, live in a gregarious state during the breeding months, and afterwards spread over the country in a state of solitude and dispersion. Some are observed to breed and live the whole year in society, such as the pigeons, rooks, and starlings; while the rapacious live in continual solitude: the eagle, jealous of the rivalship of his own offspring, unmercifully expels them from that district which he has chosen for his residence, and seems equally deaf to the calls of pity and of affection

Section VI. *General Uses in the Economy of Nature.*

In the general history of birds we must not overlook their important uses to the world at large. The rapacious kinds evidently serve the purpose of preserving the salubrity of the air, by devouring all sorts of carrion, scattered over the surface of the globe. The earth every where teems with living creatures, whose natural death, or accidental destruction, would communicate to the atmosphere a putrid and noxious influence, were their carcases allowed to dissolve and mingle with the soil by the slow process of corruption. The order of grallæ, or waders, are evidently destined by nature to co-operate in the same necessary employment. They destroy toads, frogs, lizards, and serpents, animals noxious while alive, and whose bodies, when dead, must more or less infect the air with putrid vapours. On this account, the inhabitants of Holland and of Egypt are greatly indebted to the labours of the stork: in the latter country, which abounds with every hideous reptile which a humid soil or sultry sun can quicken into life, this favourite bird lives, even in its wild state, protected by the laws of that ancient kingdom.

The granivorous birds are also deemed of great utility in the system of nature; because they abridge the fertility of those weeds which emit such immense quantities of seed as would soon overspread the earth; and which, if left unrestrained, would infallibly overpower the more useful vegetables. Many species are farther useful in transporting seeds from one country to another, and thus disseminating plants more universally over the surface of the globe. Some of the water-fowl perform a similar service, by transporting the spawn of different kinds of fishes, and replenishing the waters where their inhabitants have been extirpated or diminished. The seeds of plants, and the spawn of fishes, are in many instances know to resist the digestion of animals, and to pass through their bodies unassimilated, and still in possession of their prolific qualities: water-fowl also perform the same office in their element which the rapacious birds do in the air; they prevent the putrifactions of stagnated waters, and preserve their purity by destroying vast numbers of aquatic animals with which they teem, whose bodies, by corruption, would render it pernicious. Thus throughout the whole empire of nature every province is subservient to the general welfare: vegetables, insects, and fishes supply many animals, while the former are more universally disseminated by the latter; every order contributes to assist and nourish the adjoining one, or to check its exuberance. Thus a due balance and proportion is maintained throughout the whole; and no nation in the universal republic is allowed to surpass its boundaries, or overpower its neighbours.

Besides the uses to which the feathered tribes are subservient in the general plan of nature, we may contemplate their connection with man, and observe how far they contribute to his pleasure or advantage. With regard to his support, their utility is momentous: for it is remarkable, that of the vast number of birds which inhabit the globe, it has never yet been discovered that a single one is of a poisonous nature. They differ, indeed, in being more or less salutary and palatable, as an article of diet; but none of them are pernicious: none of their eggs, in like manner, have been found of a noxious quality; a circumstance well known to seafaring people, who eat freely every species of egg, without finding any evil consequence. Their eggs, however, as well as their flesh, vary considerably in taste; some are greatly preferable to others. The eggs of those termed game, and of the different species of gallinaceous birds, are generally reckoned agreeable: of the caper-cailie, it is said, that its eggs are the most delicate hitherto known; those of the ptarmigan, lapwing, and bustard, are also coveted by many, who prefer them to the eggs of the domestic poultry.

As an article of diet, all the carnivorous birds are avoided; though by no means poisonous, their flesh is hard, tough, and often of a fœtid smell. The piscivorous too, and especially those with sharp bills, are generally disliked; though some of the young are eaten with avidity, such as the marret, puffin, and gannet. All the water-fowl, even those with flat bills, are generally reckoned a heavy and rancid food: the goose and duck are probably the best, and these are much improved by being kept at a distance from water, and restricted from fishes.

The insectivorous birds, though not noxious, are likewise generally avoided as an article of food, from their impure manner of feeding: on the contrary, all the tribes of finches, and other small birds who feed upon grain or seeds, are much esteemed. The woodcock, snipe, and bittern, the whole tribe called mud-suckers, are accounted a great delicacy among the connoisseurs; by these, too, are approved the muir-cock, partridge, and capercailie: it remains doubtful, however, whether the food of any bird can justly be preferred to the common poultry.

The next article relating to the general history of birds, is their domestication. Although the flesh, eggs, and feathers of birds are valuable articles in the commerce of life, yet very few of this numerous class of animals has been made subservient to economical uses by domestication. Shy, timid, or fierce in their nature, they appear but little susceptible of attachment or obedience. Jealous of liberty, and furnished with effectual means of escape, they fly the haunts of men, and by far the greater part continues in the primitive wildness of nature. Few even of those which we term domestic discover that familiarity or affection that obtains among those quadrupeds which have given up independence for protection, and to whose constant ministry we are so much indebted.

Of the first order of birds, the rapacious, not one species has ever been domesticated by man, except a few, for the purposes of falconry; and these are always taken when young from the nests of the wild ones; a proof that they do not thrive

and propagate in their captivity. As their acquired habits are conferred upon them with great difficulty, so they are slight, and easily effaced: a hawk, when he gets at a certain distance from his keepers, seldom wishes to return. The numerous tribe of pies contains not one species that has ever been reduced to a domestic state. Their food could not easily be procured in captivity; their manner of life is unfavourable to it, and their flesh is deemed impure as an article of food. The gallinaceous order contains several species, which have with great advantage been made subservient to the purposes of domestic economy, viz. the peacock, the turkey, the barn-door fowl, and Guinea-hen: the last of these, however, has but lately been imported into Britain; the common poultry are originally from Asia, but were early introduced into Europe.

Of the columbine tribe one species only has been tamed, that of the common pigeon, which is well known, and in some places a very lucrative object of commerce. None of the passarine or struthious orders have yet been domesticated, though many of the former are reckoned delicate food. Four species of the duck kind have been brought from their wild state to the service of man; the swan, the goose, the Guinea duck, and the wild duck. The grallæ, or waders, are deemed such excellent food, as to provoke the appetite of the pampered epicure, such as the woodcock, snipe, curlew, stork, and crane; yet not one of all this numerous class has ever been brought into a domestic situation. This enumeration suggests a remarkable fact, that of four thousand different species of birds, described by Latham, not more than ten or twelve have been rendered serviceable to the human race by domestication.

It is to be regretted, that the acquaintance of man with the feathered race is so limited, as many species may no doubt be found, which, if domesticated, would add to his stock of subsistence, increase his industry, and multiply his amusements. We have reason to believe, that even the birds of the warmest climates might, if otherwise proper for the purpose, be successfully domesticated, even in these northerly countries. Many of those which we already possess are natives of the intratropical parts of the earth. The common turkey and Guinea-hen were originally inhabitants of Africa, and probably of the burning regions under the line. The skeldrake, a bird rather larger in size than our common duck, is one of those which, it is presumed, might be rendered useful by domestication. It is tamed with facility; and though it lives on the shore, it has been found by experience that it will thrive and breed in ponds. It is more beautiful in plumage than the common duck, and is equally proper for the uses of the table. The domestication of the Canadian goose has also been attempted with success at the seat of a nobleman in Scotland. The eider duck, a bird rather smaller than the goose, should also be tamed, especially as its down is considered as an article of value.

From the weight and size of the bustard, in which it is superior to the turkey, this bird seems highly useful for the table; and from the nature of its food, which is grain, it seems perfectly fitted for domestication. Its eggs are said to be preferable to those of all other birds, and its flesh is nutritive: from its weight it is scarcely capable of raising itself from the ground; a circumstance which renders it perhaps too easy a prey to the sportsman, but which seems favourable to its domestication. Similar to the bustard in its manner of life is the field-duck, a native of France; a bird which might be brought into this country, and tamed with great facility. The American pigeon might with propriety be introduced into this country from Canada, where it abounds, and constitutes a great part of the food of the inhabitants.

Besides the birds fitted for domestication, there are others which might be imported to this island from abroad, and might prosper in a wild state. The hazel hen, so much esteemed in Germany both for the sport and the table, the Francolin of Italy, and the red-legged partridge of Spain, might all be easily introduced into Britain, to the great increase of our game. The last of these is domesticated at Cadiz, and is found in its wild state in plenty throughout Spain and France. It might be transported to Britain in either state, perhaps with equal or greater success than the golden and China pheasants, which some gentlemen have so earnestly endeavoured to propagate upon their estates. The crested turkey abounds in its wild state in the inland parts of New-England. The great quantities of food which the inhabitants obtain by killing this bird, clearly point out the advantages to be derived from its domestication, and the propriety of transporting it into this country. The same reason exists for introducing the American pigeon, which constitutes so considerable a part of the subsistence of the inhabitants of Canada.

But the greatest desideratum in the transportation of birds, seems to be that of the capercaillie. This bird is indigenous in Scotland, and was formerly spread over the whole country; but from the facility with which it is killed, it became an easy prey to the sportsman, and is now so nearly extirpated from the island, that, except in some remote districts of the Highlands, it is no where to be found. The black-cock or heath-fowl, too, is rapidly diminishing in number; its extermination appears to be at no very remote period, unless it be transported, and preserved on those estates where it formerly abounded.

In the later arrangement of birds, although it cannot be said that our ornithologists have lost sight of their great predecessor Linnéus, yet the necessity of deviating from him in many instances (and we have felt the necessity in the preceding treatise) must seem obvious to every one, when the great number of species which have come to our knowledge of late years is considered. In his last edition of the Systema Naturæ, Linnéus enumerates 930 birds only: while in Mr. Latham's index and synopsis they have been increased to very nearly four thousand, a number never imagined by former writers to exist in nature.

M. Biberg, in his excellent treatise on the Economy of Nature (Amœnitat. Acad. vol. ii.) calculates the probability of the vegetable kingdom furnishing as far as 10,000 species: that of the vermes 2000; insects 10,000; amphibia 300; fishes 2000; quadrupeds 200. How far we have already exceeded this number in every department the naturalist can easily testify; but how much farther the list may be increased no one will venture to predict, whilst the ardour and indefatigable industry of the present race of enquirers, added to the taste for possessing new acquisitions and exploring new countries shall continue.

We beg to refer our readers for more information to the valuable work on British Ornithology, by Mr. Graves, of Walworth.

ORNITHOPUS. Bird's foot. In botany, a genus of the class diadelphia, order decandria. Calyx tubular, with five nearly equal teeth; loment joined, cylindrical, curved. Five species, of which one is common to our own pastures; and was formerly supposed to afford in its leaves a good lithontriptic.

ORNITROPHE. In botany, a genus of the class octandria, order monogynia. Calyx four-parted; corol four-petalled; style cloven; germ double; berries two, one-seeded. Six species, natives of the East and West Indies.

OROBANCHE. Broom rape. In botany, a genus of the class didynamia, order angiospermia. Calyx of two-lobed, lateral divisions; corol ringent; capsule one-celled, two-valved, many-seeded; a gland at the base of the germ beneath. Eighteen species, the greater number with a four-cleft, but several with a five-cleft corol. Scattered over Europe, Asia, and America; five common to the fields and woods of our own country.

OROBUS. Bitter-vetch. Heath-pea. In botany, a genus of the class diadelphia, order decandria. Style linear, cylindrical, downy on the upper side; calyx obtuse at the base, the upper segments shorter and deeper cut. Thirteen species; European plants; two indigenous to the woods of our own country.

The following are the cultivated species.

1. O. lathyroides. Upright bitter vetch.
2. O. luteus. Yellow bitter vetch.
3. O. vernus. Spring bitter vetch.
4. O. tuberosus. Tuberous bitter vetch.
5. O. nigrus. Black bitter vetch.
6. O. Pyrenaicus. Pyrenean bitter vetch.

They are all hardy, flowering, ornamental plants, for the borders, clumps, and other parts of pleasure grounds; and are all easily propagable. The Highlanders of Scotland are particularly fond of O. tuberosus, or wood-pea, as it is frequently called. They dry and chew the fruit, or intermix it with their liquids, to give them a particular flavour: in some parts of Scotland it is used as a food, and steeped and fermented for a diet drink. It is also employed at times medicinally in pulmonary affections.

OROFIO (Balthasar), a Spanish Jew, born at Seville, and professor of metaphysics at Salamanca; but having studied medicine, he returned to his native place, where he practised with reputation, till being accused of judaism he was seized by the inquisition, and underwent horrible tortures. He had no sooner recovered his liberty than he proceeded to Toulouse, where he became professor of physic. He shortly after left that place, and went to Amsterdam, where he professed judaism.

ORONOKO, a river of Terra Firma, which issues from the small lake Ipava, in lat. 6 5 N. flows E. and S.E. to the lake Parima, from which it runs toward the W. but after receiving the Guaviari, it bends N. then N.E. and E. till it enters the Atlantic by an extended delta of mouths opposite the isle of Trinidad; but the principal one is considerably to the S.E. of that island, in lat. 8 30 N. In this singular winding course, estimated at 1400 miles, it receives many large rivers; and its chief estuary is so deep and impetuous as to stem the most powerful tides. See PARIMA.

ORONSA, a small fertile island of Scotland, one of the Hebrides, to the S. of Colonfa, from which it is separated by a narrow channel that is dry at low water. Here are the ruins of an abbey, with many sepulchral statues, and some curious ancient sculpture.

ORONTIUM. In botany, a genus of the class hexandria, order monogynia. Spadix cylindrical, covered with florets; corol six-petalled, naked; styleless; follicles one-seeded. Two species; marsh plants of Japan and Canada.

OROPESA, a town of Spain, in Valencia, on a cape of its name, in the Mediterranean, 55 miles E.N.E. of Valencia. Lon. 0. 5 E. Lat. 40. 8 N.

O'RPHAN *s.* (ορφανος.) A child who has lost father or mother, or both (*Spenser*).

O'RPHAN. *a.* (*orphelin*, French.) Bereft of parents (*Sidney*).

O'RPHANAGE. O'RPHANISM. *s.* (from *orphan*.) State of an orphan.

ORPHA'NOTROPHY. *s.* (ορφανος and τροφη.) An hospital for orphans.

ORPHEUS, a son of Œager by the muse Calliope. Some suppose him to be son of Apollo, to render his birth more illustrious. He received a lyre from Apollo, or, according to some, from Mercury, upon which he played with such a masterly hand, that even the most rapid rivers ceased to flow, the savage beasts of the forest forgot their wildness, and the mountains came to listen to his song. Of all the nymphs who used to listen to his song, Eurydice was the only one who made a deep impression on the musician, and their nuptials were celebrated. Their happiness, however, was short; Aristæus became enamoured of Eurydice, and, as she fled from her pursuer, a serpent, lurking in the grass, bit her foot, and she died of the wound. Orpheus resolved to recover her or perish in the attempt. With his lyre in his hand, he entered the infernal regions, and gained admission to Pluto. The king of hell was charmed with his strains, the wheel of Ixion stopped, the stone of Sisyphus stood still, Tantalus forgot his thirst, and even the furies relented. Pluto and Proserpine were moved, and consented to restore him Eurydice, provided he forbore looking behind till he had come to the extremest borders of hell. The conditions were accepted, and Orpheus was already in sight of the upper regions of the air when he forgot, and turned back to look at his long lost Eurydice. He saw her, but she instantly vanished from his eyes. He attempted to follow her, but he was refused admission. He then separated himself from the society of mankind, and the Thracian women, offended by his coldness to their amorous passion, having torn his body to pieces, threw his head into the Hebrus, which still

articulated the words Eurydice! Eurydice! as it was carried down the stream into the Ægean sea. Orpheus was one of the Argonauts, of which celebrated expedition he wrote a poetical account, still extant. This, however, is doubted by Aristotle. Orpheus after death received divine honours, the muses gave an honourable burial to his remains, and his lyre became one of the constellations in the heavens.

Lucian writes thus concerning the death of Orpheus: "When the Thracian women killed Orpheus, it is said his head which they threw into the river swam a long time upon his harp, uttering mournful tones in honour of the said hero, and that the harp being touched by the winds answered the mournful song; and in this condition they arrived at the isle of Lesbos, where the people erected a funeral monument for him, in the place where Bacchus's temple now stands; but they hung up his harp in Apollo's temple, where the same was kept a long time till the son of Pittacus having heard say that it played of itself, and charmed woods and rocks, had a mind to have it for himself; and so bought it for a good sum of money of the sacristan: but not thinking he could play safely in the city, he went by night to the suburbs, where as he went about to touch it, it made such a dreadful noise, instead of the harmony he expected, that the dogs run thither and tore him in pieces, and so was attended with the same fate herein as Orpheus himself." There are some authors who say, that the Menades tore Orpheus in pieces, because he having sung the genealogy of all the gods, had said nothing of Bacchus, and the said god to be revenged on him caused his priestesses to kill him. Others say, this misfortune befel him by the resentment of Venus, to whom Calliope, Orpheus's mother, had refused to give Adonis any longer than for 6 months in the year; and that to revenge the same, she made all the women in love with Orpheus; and that every one of them being disposed to enjoy him, they had in that manner tore him in pieces.

Cicero says, that Aristotle thought there never was such a one as Orpheus, and that the poems which were attributed to him were the works of a Pythagorean philosopher. In the mean time, it is hard to doubt there was such a one, after so many testimonies of the ancients to the contrary, since Pausanias makes mention of Orpheus's tomb, and of the hymns he had composed, which, he says, came but little short of the elegancy and beauty of those of Homer; but that his wit was attended with more religion and piety than the others. Justin reports, that Orpheus, Homer, Solon, Pythagoras and Plato had travelled into Egypt, that they got there some knowledge of the scriptures, and that afterwards they retracted what they had before written concerning the superstitious worship of their false deities in favour of the religion of the true God: Orpheus, according to this father, in his verses spoke very clearly concerning the unity of God, as of him who had been, as it were, the father of that extravagant multiplicity of the heathen gods.

With respect to the writings of Orpheus, he is mentioned by Pindar as author of the Argonautics, and Herodotus speaks of his Orphics. His hymns, says Pausanias, were very short, and but few in number; the Lycomides, an Athenian family, knew them by heart, and had an exclusive privilege of singing them, and those of their old poets, Musæus, Onomacritus, Pamphus, and Olen, at the celebration of the Eleusinian mysteries; that is, the priesthood was hereditary in this family.

Jamblicus tells us, that the poems under the name of Orpheus were written in the Doric dialect, but have since been transdialected, or modernised. It was the common opinion in antiquity that they were genuine; but even those who doubted of it gave them to the earliest Pythagoreans, and some of them to Pythagoras himself, who has frequently been called the follower of Orpheus, and has been supposed to have adopted many of his opinions.

Of the poems that are still subsisting under the name of Orpheus, which were collected and published at Nuremberg 1702, by Andr. Christ. Eschenbach, and which have been since reprinted at Leipsic 1764, under the title of Ορφεως Απαντα, several have been attributed to Onomacritus, an Athenian, who flourished under the Pysistratidæ, about 500 years before Christ. Their titles are, 1. The Argonautics, an epic poem. 2. Eighty-six hymns; which are so full of incantations and magical evocation, that Daniel Heinsius has called them *verum Satanæ liturgium*, the true liturgy of the devil. Pausanias, who made no doubt that the hymns subsisting in his time were composed by Orpheus, tells us, that though less elegant, they had been preferred for religious purposes to those of Homer. 3. De lapidibus, a poem on precious stones. 4. Fragments, collected by Henry Stevens. Orpheus has been called the inventor, or at least the propagator, of many arts and doctrines among the Greeks. 1. The combination of letters, or the art of writing. 2. Music, the lyre, or cithara, of seven strings, adding three to that of Mercury. 3. Hexameter verse. 4. Mysteries and theology. 5. Medicine. 6. Magic and divination. 7. Astrology. Servius upon the sixth Æneid, p. 450, says, Orpheus first instituted the harmony of the spheres. 8. He is said likewise to have been the first who imagined a plurality of worlds, or that the moon and planets were inhabited.

ORPIMENT, in mineralogy, an arsenical ore of a particular kind. See ARSENICUM.

ORPINE, in botany. See SEDUM.

ORPINE (Lesser). See CRASSULA.

ORPINE TREE. See TELLOPHIUM.

ORR, a river of Scotland, in Kirkcudbrightshire, which issues from a small lake to the E. of New Galloway, and flows to Solway Frith, at Dalbeattie.

ORRERY, a curious machine for representing the motions or phases of the heavenly

bodies. The reason of its being called an orrery was this: Mr. Rowley, a mathematical instrument-maker, having got one from Mr. George Graham, the original inventor, to be sent abroad with some of his own instruments, he copied it, and made the first for the earl of Orrery. Sir Richard Steel, who knew nothing of Mr. Graham's machine, thinking to do justice to the first encourager, as well as to the inventor, of such a curious instrument, called it an orrery, and gave Mr. Rowley the praise due to Mr. Graham.

The machine represented in pl. 106, is Rowley's orrery. The frame which contains the wheel work, &c. and regulates the whole machine, is made of ebony, and about four feet in diameter. Above the frame is a broad ring supported with 12 pillars, which represents the plane of the ecliptic having two circles of degrees, and between these the names and characters of the 12 signs. Near the outside is a circle of months and days, corresponding to the sun's place at noon each day throughout the year. Above the ecliptic stand some of the principal circles of the sphere, viz. No. 10, are the two colures, divided into degrees and half degrees; No. 11, is one-half of the equinoctial circle, making an angle of 23½ degrees. The tropic of Cancer, and the arctic circle, are each fixed parallel at their proper distance from the equinoctial. On the northern half of the ecliptic is a brass semicircle, moveable upon two points fixed in ♈ and ♎, representing the moveable horizon to be put to any degree of latitude upon the north part of the meridian, and the whole machine may be set to any latitude without disturbing any of the internal motions, by two strong hinges (No. 13.) fixed to the bottom-frame upon which the instrument moves, and a strong brass arch, having holes at every degree, through which a strong pin is put at every elevation. This arch and the two hinges support the whole machine when it is lifted up according to any latitude; and the arch at other times lies conveniently under the bottom-frame. When the machine is set to any latitude (which is easily done by two men, each taking hold of two handles conveniently fixed for the purpose,) set the moveable horizon to the same degree upon the meridian, and you may form an idea of the respective altitudes or depression of the planets both primary and secondary. The Sun (No. 1.) stands in the middle of the whole system upon a wire, making an angle with the ecliptic of about 82 degrees. Next the Sun is a small ball (2) representing Mercury. Next to Mercury is Venus (3), represented by a larger ball. The earth is represented (No. 4.) by an ivory ball, having some circles and a map sketched upon it. The wire which supports the earth makes an angle with the ecliptic of 66½ degrees, the inclination of the earth's axis to the ecliptic. Near the bottom of the earth's axis is a dial plate (No. 9.), having an index pointing to the hours of the day as the earth turns round its axis. Round the earth is a ring supported by two small pillars, representing the orbit of the moon; and the divisions upon it answer to the moon's latitude. The motion of this ring represents the motion of the moon's orbit according to that of the nodes. Within this ring is the moon (No. 5.), having a black cap or case, by which its motion represents the phases of the moon according to her age. Without the orbits of the earth and moon is Mars (No. 6.) The next in order to Mars is Jupiter and his four moons (No. 7.) Each of these moons is supported by a wire fixed in a socket which turns about the pillar supporting Jupiter. These satellites may be turned by the hand to any position, and yet when the machine is put into motion, they will all move in their proper times. The outermost of all is Saturn, his five moons, and his ring (No. 8.) These moons are supported and contrived similar to those of Jupiter. The machine is put into motion by turning a small winch (No. 14.); and the whole system is also moved by this winch, and by pulling out and pushing in a small cylindrical pin above the handle. When it is pushed in, all the planets, both primary and secondary, will move according to their respective periods by turning the handle. When it is drawn out, the motions of the satellites of Jupiter and Saturn will be stopped while all the rest move without interruption. There is also a brass lamp, having two convex glasses to be put in room of the sun; and also a smaller earth and moon, made somewhat in proportion to their distance from each other, which may be put on at pleasure. The lamp turns round at the same time with the earth, and the glasses of it cast a strong light upon her; and when the smaller earth and moon are placed on, it will be easy to show when either of them will be eclipsed. When this machine is intended to be used, the planets must be duly placed by means of the ephemeris; and you may place a small black patch or bit of wafer upon the middle of the Sun, Venus, Mars, and Jupiter. Put in the handle, and push in the pin which is above it. One turn of this handle answers to a revolution of the ball which represents the earth about its axis; and consequently to 24 hours of time, as shown by the hour-index (9.), which is marked and placed at the foot of the wire on which the ball of the earth is fixed. Again, when the index has moved the space of ten hours, Jupiter makes one revolution round its axis, and so of the rest. By this means the revolutions of the planets, and their motions round their own axes, will be represented to the eye.

Considerable improvements in the construction of the orrery were made by Desaguliers, Ferguson, &c. The most complete orrery made by Desaguliers has been lately brought from the Tower of London, where it was almost lost amongst rubbish, and placed in a proper situation for use in the Royal Military Academy, Woolwich.

ORRICE. See Iris.

ORSOVA, a town and fortress of Upper

Hungary, on the confines of Servia, subject to the Turks. The fortress was besieged by the Austrians in 1790, but without success. It stands on the N. side of the Danube, 60 miles S.E. of Temeswar, and 75 E. of Belgrade. Lon. 22. 40 E. Lat. 45. 10 N.

ORSZA, a town of Lithuania, in the palatinate of Witepsk, with a castle, seated on the Dnieper, 36 miles N. of Mohilef, and 52 S. by E. of Witepsk.

ORTA, a town of Italy, in the patrimony of St. Peter, seated near the Tiber, 10 miles E. of Viterbo.

ORTA, a town of Italy, in the Milanese, on a lake of the same name, 21 miles N.N.W. of Novara.

ORTEGAL, a cape and castle of Spain, on the N. coast of Galicia, 30 miles N.N.E. of Ferrol. Lon. 7 39 W. lat. 43 46 N.

ORTEGIA, in botany, a genus of the class triandria, order monogynia. Calyx five-leaved, corolless, capsule one-celled; seeds numerous. Two species, natives of Spain and Italy; trailing with small, axillary, green flowers.

ORTELIUS (Abraham), a celebrated geographer, born at Antwerp, in 1527, was well skilled in the languages and the mathematics, and acquired such reputation by his skill in geography, that he was surnamed the Ptolemy of his time. Justus Lipsius, and most of the great men of the 16th century, were Ortelius's friends. He resided at Oxford in the reign of Edward VI, and came a second time into England in 1577. His Theatrum Orbis was the completest work of the kind that had ever been published, and gained him a reputation equal to his immense labour in compiling it. He also wrote several other excellent geographical works; the principal of which are his Thesaurus, and his Synonyma Geographica. The world is likewise obliged to him for the Britannia, which he persuaded Camden to undertake. He died at Antwerp in 1598.

ORTHIA, a surname of Diana at Sparta. In her sacrifices it was usual for boys to be whipped. Vid. DIAMASTIGOSIS.

ORTHIAN. (Greek.) The epithet applied by the ancients to a dactylic nome, or song, said to be invented by the Phrygian Olympus. Herodotus tells us, that it was the Orthian nome that Arian sung when thrown into the sea.

ORTHODOXLY. *ad.* (from *orthodox.*) With soundness of opinion (*Bacon*).

ORTHODOXY. (formed from ὀρθος, right, and δοξα, opinion, judgment.) A soundness of doctrine or belief, with regard to all the points and articles of faith.

According to the proper etymology of the word, orthodoxy denotes what every honest man believes his own opinions to be, in contradistinction to the opinions of others, which he rejects. In England it is vulgarly restricted to signify the opinions contained in the Thirty-nine Articles; and in Scotland it is in like manner used to denote the doctrines contained in their confession of faith. It is, in general, applied to the opinions that are maintained by those called Calvinists.

Orthodoxy is used in opposition to heterodoxy, or heresy.

ORTHODROMICS. That part of navigation which teaches the art of sailing in the arch of some great circle.

The word is Greek, ὀρθοδρομικα, derived from ὀρθος, *rectus*, straight, and δρομος, *cursus*, run or distance; q. d. the straight or shortest distance; and this can only be in the arch of a great circle.

O'RTHOGON. *s.* (ὀρθος and γωνια.) A rectangled figure (*Peacham*).

ORTHO'GONAL. *a.* (from *orthogon.*) Rectangular.

ORTHO'GRAPHER. *s.* (ὀρθος and γραφω.) One who spells according to the rules of grammar (*Shakspeare*).

ORTHOGRA'PHICAL. *a.* (from *orthography.*) 1. Rightly spelled. 2. Relating to the spelling (*Addison*). 3. Delineated according to the elevation.

ORTHOGRA'PHICALLY. *ad.* According to the rules of spelling. 2. According to the elevation.

ORTHOGRAPHIC PROJECTION OF THE SPHERE, that wherein the eye is supposed to be at an infinite distance; so called, because the perpendiculars from any point of the sphere will all fall in the common intersection of the sphere with the plane of the projection. See GEOGRAPHY, and PROJECTION.

ORTHOGRAPHY, that part of grammar which teaches the nature and affections of letters, and the just method of spelling or writing words, with all the proper and necessary letters, making one of the four greatest divisions or branches of grammar. See GRAMMAR.

ORTHOGRAPHY, in geometry, the art of drawing or delineating the fore right plan of any object, and of expressing the heights or elevations of each part. It is called orthography, for its determining things by perpendicular lines falling on the geometrical plane.

ORTHOGRAPHY, in architecture, the elevation of a building.

ORTHOGRAPHY, in perspective, is the fore right side of any plane, i. e. the side or plane that lies parallel to a straight line, that may be imagined to pass through the outward convex points of the eyes, continued to a convenient length.

ORTHOPNOEA. (*orthopnoea*, from ὀρθος, and πνοη, breathing.) A very quick and laborious breathing, during which the person is obliged to be in an erect posture.

ORTHOTRICUM. In botany, a genus of the class cryptogamia, order musci: capsules ovate-oblong; fringe double; outer of sixteen teeth placed in pairs; inner of eight or sixteen filiform teeth, which are sometimes wanting; veil conic, mostly composed of erect hairs. Nine species; seven mosses common to our heaths and wilds; of which two have a simple, and the rest a double fringe.

ORTHRUS, or ORTHOS, a dog which belonging to Geryon. He had two heads, and was sprung from the union of Echidna and Typhon. He was destroyed by Hercules.

ORTIVE (*ortivus.*) In astronomy. Ortive, or eastern amplitude, is an arch of the horizon intercepted between the point where a star rises, and the east point of the horizon, or point where the horizon and equator intersect. See AMPLITUDE.

ORTOLAN. in ornithology. See EMBERIZA.

ORTS. *s.* Refuse; things left or thrown away: obsolete (*Jonson*).

ORTON, a town in Westmoreland, with a market on Wednesday, 12 miles S.W. of Appleby, and 271 N.N.W. of London. Lon. 2. 40 W. Lat. 54. 28 N.

ORTYGIA, a small island of Sicily, within the bay of Syracuse, which formed once one of the four quarters of that great city. It was in this island that the celebrated fountain of Arethusa arose.—2. An ancient name of the island of Delos. Some suppose that it received this name from Latona, who fled thither when changed into a quail (ὄρτυξ) by Jupiter, to avoid the pursuits of Juno. Diana was called Ortygia, as being born there.

ORTZA, a town of Lithuania, in the palatinate of Witepsk, with a castle, seated at the confluence of the Orsa and Dnieper, 50 miles W. of Smolensko. Lon. 31. 5 E. Lat. 54. 45 N.

ORVIETO, a town of Italy, capital of a territory of the same name, in the patrimony of St. Peter, with a bishop's see and a magnificent palace. In this place is a deep well, into which mules descend, by one pair of stairs, to fetch up water, and ascend by another. It is seated on a craggy rock, near the confluence of the rivers Paglia and Chiana, 20 miles N.W. of Viterbo, and 50 N. by W. of Rome. Lon. 12. 20 E. Lat. 42. 42 N.

ORUS, or HORUS, one of the gods of the Egyptians, son of Osiris and of Isis. He assisted his mother in avenging his father, who had been murdered by Typhon. Orus was skilled in medicine, he was acquainted with futurity, and he made the good and the happiness of his subjects the sole object of his government. He was the emblem of the sun among the Egyptians, and he was generally represented as an infant, swathed in variegated clothes. In one hand he holds a staff, which terminates in the head of a hawk, in the other a whip with two thongs.

ORWELL, a river in Suffolk, which runs S.E. by Ipswich, and uniting with the Stour forms the fine harbour of Harwich. Above Ipswich it is called the Gipping.

ORYCTOLOGY. (from ὀρύσσω, to dig, and λόγος, a treatise. The doctrine or science of fossils.

Fossils, or substances dug out of the bowels of the earth, are of two kinds; native, or those that belong to the mineral kingdom naturally; and adventitious, or those that have been incidentally introduced into it, and have become a part of it. Both these kinds of materials may be regarded as constituting distinct branches of mineralogy; but the last is so closely connected with the general history of vegetables and animals, from petrifactions, or other alterations of the various materials belonging to which kingdoms they usually originate, as to be more conveniently treated of under a separate inquiry: and hence two distinct names have been selected for the two sciences of native and adventitious fossils, and while the former has been called oryctognosy, the latter has been denominated oryctology. The first is distinctly and necessarily a branch of mineralogy, and has already been treated of as such under that article. The second we have reserved for the present place, and shall treat of it by itself. In doing this we shall have occasion to draw very largely upon Mr. Parkinson's very excellent work the Organic Remains of a former World, to which we are also indebted for several valuable and curious plates, which we have already introduced, or shall have occasion to introduce, into this work, in elucidation of the subject before us; and we shall fill up the picture from M. Cuvier's very accurate and excellent papers, published chiefly in the different volumes of the Annales du Museum d'Histoire Naturelle.

It is curious to observe how different an impression the same natural appearances have made on the human mind in different stages of its improvement. A phænomenon, which in one age has excited the greatest terror, has in another been an object of calm and deliberate observation; and the things which have at one time led to the most extravagant fiction, have, at another, only served to define the boundaries of knowledge. The same comet which from the age of Julius Cæsar had three times spread terror and dismay through the nations of the earth, appeared a fourth time in the age of Newton, to instruct mankind, and to exemplify the universality of the laws which that great interpreter of nature had discovered. The same fossil remains which to St. Augustine or Father Kircher seemed to prove the former existence of giants of the human species, were found by Pallas and Cuvier to ascertain the nature and character of certain genera and species of quadrupeds which have now entirely disappeared.

From a very early period, indeed, such bones have afforded a measure of the credulity, not of the vulgar only, but of the philosophers. Theophrastus, one of the ancients who had most devoted himself to the study of nature, believed, as Pliny tells us, that bones were a sort of mineral production that originated and grew in the earth. St. Augustine says, that he found on the sea-shore near Utica a fossil human tooth, which was a hundred times the size of the tooth of any person living; and Pliny tells us, that by an earthquake in Crete a part of a mountain was opened, which discovered a skeleton sixteen cubits, or twenty-four feet long, supposed to be that of Orion. Xenophanes, more than four hundred years before Christ, was led to the belief of the eternity of the universe, by discovering the remains of different marine animals imbedded in rocks, and under the surface of the earth. Herodotus ascertained the existence of fossil shells in the mountains of Egypt, and was thereby induced to conclude that the sea must have once covered those parts. In the pyramids of Egypt, mentioned by this author, and which had been built at so early a period that no satisfactory accounts could be derived from tradition respecting their erection, the stones were found to contain the remains of marine animals, and particularly of such as exist no longer in a

recent state, and differ essentially from all known animals. These were supposed by Strabo, who saw the fragments of these stones laying around the pyramids, to be the petrified remains of the lentils which had been used for food by the workmen. Eratosthenes, Xanthus of Lydia, and Strabo have all noticed and variously commented upon the existence of animal remains thus wonderfully preserved. In the works of Pliny many fossil bodies are mentioned, particularly the bucardia, resembling an ox's heart, but which was doubtlessly a cast formed in a bivalve shell; glossopetra, bearing the form of a tongue, and supposed to fall from the moon, when in its wane; hammites, resembling the spawn of fish; horns of ammon, resembling, in form, the ram's-horn; lepidotes, like the scales of fishes; meconites, bearing a resemblance to the seeds of poppies; brontia, to the head of a tortoise; spongites, to sponge; phycites to sea-weeds, or rushes, &c. Although many were convinced, by the exact resemblance which several of these substances bore to different species of marine animals, that these must be the remains of such animals, and must have been deposited on these spots, at a period when they were covered by the sea; others, unable to comprehend a circumstance so inexplicable as the existence of the sea over some of the highest mountains, chose rather to have recourse to an apparently more easy mode of explanation, by attributing their formation to the energies of certain occult powers, such as the vis plastica, vis formativa, and vis lapidificativa.

The formation of these bodies was also attributed, by our countryman, Dr. Plot, to certain plastic powers inherent in some saline bodies; and Dr. Woodward, one of our latest writers on these substances, although aware that the situations in which these bodies were found could only be explained by the powerful and extensive effects of the deluge, found himself obliged also to have recourse to an occult plastic power to explain the formation of some of these substances. "There are," he observes, "various phænomena, that plainly shew that when they were brought forth at the deluge the earth was destroyed, all the solids of it, metals, minerals, stone, and the rest, dissolved, taken up into the water, and there sustained along with the sea-shells, and other extraneous bodies, till at length all settled down again, and formed the strata of the present earth. The shells, and other extraneous bodies, being thus lodged among this stony and other mineral matters, that afterwards became solid; when this comes now to be broke up, it exhibits impressions of the shells, and other bodies lodged in it; showing even the hardest of it to have been once in a state of solution, soft, and susceptible of impression." (Preface to Catalogue of English Fossils, p. 3.) But unable otherwise to oppose the opinion of Dr. Buttner, that the fossil corals were actually corals which had existed before the flood, he had recourse to the supposition of their having derived their forms from a second arrangement of their component parts, whilst in the waters of the deluge "I have seen," he says, "fossil coralloids that have been composed of various sorts of mineral and metallic matter, that yet have been formed into shape of the marine mycetitæ, astroitæ, and other like corals. Now all these have been formed out of the dissolved mineral and metallic matter in the water of the deluge. The antediluvian corals were like all other solid stony bodies then in solution in that water, and might concrete again, and form true corals there as well as in the sea water. Doubtless it did so; but that matter was in so small a quantity, and bore so little a proportion to the mineral and metallic, with which it was then mixed and confused, as now rarely, if ever, to be met with." (Letters on Fossils, by Dr. Woodward, p. 82.) At present no one hesitates at considering all organised fossil bodies as having existed during a former state of this globe, and having been then endued with the energies of vegetable or animal life.

Various appellations have been employed for the purpose of distinguishing these bodies from those minerals which do not owe their forms to animal or vegetable organization.

Figured stones (lapides figurati et idiomorphi) and diluvian stones (lapides diluviani) were terms well chosen by the earlier mineralogists to designate these bodies, of the peculiar forms of which, and of their having probably obtained those forms from some changes depending on the deluge, they only could, with any propriety, speak. The term fossil comprising every mineral substance dug out of the earth, it was thought necessary to distinguish these by the term adventitious or extraneous. To this generally adopted mode of distinction, Mr. Parkinson objects. (Organic Remains, vol. i. p. 34.)

The term extraneous, he observes, denotes that the substance spoken of is foreign to the region in which it is found; a sense in which, he thinks, it cannot, with propriety, be applied to such bodies as are almost deprived, not only of their primitive form, but of their original constituent principles. In these cases, where so considerable a degree of naturalization, as it were, has taken place, the substance, he conceives, can no longer merit an epithet implying their being foreign to the regions in which they are found. Instances of the impropriety of this employment of the term he instances in such of the jaspers and semi-opals as have derived their origin from wood; to which the epithet of extraneous does not appear to be strictly applicable. The term adventitious, as implying the result of chance or accident, he thinks ought never to be applied to these substances; since, in all nature's works, there exist not stronger proofs of the provident design of the Almighty Creator, than in the apparently casual disposition of these substances. To the term petrifaction he objects, because a conversion into stone only is here expressed; whereas, in many instances, the substances of which the fossil is composed differs as much from stone, as from the matter of which the body was originally composed. Fossils he considers as of two kinds, primary and secondary; among the former he places those bodies which appear to have been, *ab initio*, the natives of the subterranean regions; and under the latter he disposes those substances, which, though now subjects of the mineral kingdom, bear indubitable marks of having been originally either of an animal or vegetable nature. The term fossil, however, which implies that the organized substance under examination has been dug out of the earth, appears to be sufficient, without any adjunct to express these substances; indeed this term is warranted to be thus employed by its general acceptation.

Besides those bodies, which, being actually organic remains, deserve to be considered as fossils, (fossilia, vulgo dicta of Linnéus); other bodies require to be noticed, as sometimes serving to illustrate the nature of organised fossils. These are,

impressions, (impressa, Linnéus; typolithi, Waller); casts, (redintegrata, Linnéus); and incrustations, (incrustata, Linnéus.)

Fossils naturally divide into vegetable and animal, according to which of those kingdoms they originally belonged: those of the vegetable kingdom shall be the first subjects of our inquiry.

The parts of vegetables confined in subterranean situations suffer, according to circumstances, either a complete resolution of composition, the lighter parts becoming volatilized, whilst the more fixed remain and form the substance which is termed mould (humus); or, as is supposed by Mr. Parkinson, it passes through another process, which he considers as fermentative, and becomes bituminous. Wood, thus changed, is called lignum fossile bituminosum, surturbrand, and Bovey coal. By the extension of this process, the same author supposes, that the substances termed bitumens, (naphtha, petroleum, and asphaltum), are formed. To the same process he also attributes the formation of amber, of which however no proof appears. That jet, cannel coal, and the common coal employed in domestic uses, have had a vegetable origin is rendered highly probable, from the frequency with which they manifest the impressions of various vegetable bodies.

Thus, perhaps the formation of the bituminous fossils may be satisfactorily explained; but by far the greater number of vegetable fossils are of a lapideous nature, and necessarily owe their formation to very different processes; which the same author supposes are, in general, preceded by the process by which bitumen is formed. Many bodies which are evidently of vegetable origin may be now found existing in a lapideous state, either calcareous or silicious; and many others are found possessing certain marks of the presence of some metallic substance.

To explain these formations various opinions have been formed. Some have supposed the injection of the impregnating matter, in a state of fluidity, by ignition; whilst others have imagined the gradual abstraction of the original particles of the body, and the regular deposition of the impregnating particles in the spaces which have just been left by the original matter. Mr. Parkinson, who does not admit of this substitution, attributes the formation of this description of fossils to the impregnation of vegetable substances, which have undergone different degrees of bitumization with water, holding the earths or the metals in solution. Thus with lime is formed the calcareous wood or wood-marble of Oxfordshire and Dorsetshire, of Piedmont and of Bohemia; with silex is formed the calcedonified, agatified, and jasperified wood (holzstein); and with the addition of alumine, &c. the fossil woods which now partake of the nature of pitch-stone, and wax-opal (holzopal). In other situations metallic impregnations occur; as in such woods as are impregnated with the pyrites of iron, so frequently found in our islands; and the beautiful woods of Siberia, containing the hydrat and carbonat of copper.

Various parts of trees and plants (phytolithi) are found in a mineralized state. Not only fossil wood (lithoxylon), as has been just noticed, but the leaves (lithophylla or lithobiblia), and fruits (carpolithi) of different trees or plants are thus found. Of the woods, several, from their form and texture, have been supposed to have been originally oak, willow, and such trees as now exist in a recent state; whilst others differ, in both these respects, from any species of wood which is now known.

The impressions of the stalks and leaves of plants are very frequently found in many parts of the world, in lofty mountains, as well as at a considerable depth below the surface; and not only the impressions, but the substance itself of different vegetables are also thus found; but in no situation more frequent than in the neighbourhood of coal mines.

In general these vegetable remains are found deposited in laminæ, in the schistose strata which accompany the coal; but the most perfect remains are commonly found in roundish nodular masses of ferruginous clay, which abound in the strata accompanying the coal. These are commonly termed catsheads by the workers of the coal mines, and contain pieces of fern, &c. very few, indeed, of which are found to agree with any known recent plants. The vegetable remains in these fossils appear to confirm the opinion above mentioned, of the bituminization of fossil vegetables; since these leaves are completely changed into a bituminous substance.

The remains of fruits are, perhaps, no where found so abundantly as in the Isle of Sheppey, where they are dug up in great variety; very few, however, being found which agree with any known recent fruits. Where any resemblance appears, it is with fruits which only grow in the warm Asiatic regions.

Fossil roots of plants of trees are very rarely found; a circumstance not very easily explained; since they possess (especially the roots of trees) that degree of solidity which appears to be favourable to the process of petrifaction. From the want of this necessary property it undoubtedly is that we possess so few remains of tender flower leaves, and none of pulpy fruits.

From the same cause, the great proneness to decomposition, the number of animal fossils is considerably limited: these substances being only preserved in a mineralized state, which originally possessed a considerable degree of solidity; such are the bones, teeth, horns, shells, scales, &c. The animal, however, far exceeds the vegetable kingdom in the number and variety of fossils which it yields, as well as in the distinctness of form, and excellency of preservation, in which they are found.

Adopting in a great measure the arrangement of Waller, we shall commence our examination of the animal fossils with those which have derived their origin from corals. These fossils are, of course, merely the remains of the dwellings which have been formed by the various coral insects, and which are so frequently found in the cabinets of the curious.

Immediately on commencing this examination, we are struck with a similar want of agreement between the recent and fossil corals, with that which has been noticed between recent and fossil vegetables. Of the genus tubipora it does not appear, at least by the observations made in Mr. Parkinson's second volume of The Organic Remains of a former World, that a single species which is known recent has been found as a fossil. Several fossil species are, however, described of which nothing similar is known in a recent state. The most striking of these is the tubipora catenularia, or chain coral, the surface of which, in consequence of the tubes being in contact at their sides, has frequently a very curious reticulated or

catenulated appearance. Tubipora fascicularis, T. stellata, T. repens, and T. strues, which have been described by different authors, and which are unlike to any known recent tubipore, give reason for supposing that the number of species of fossil tubipores exceeds that of the recent species.

The fossil madrepores are not less rich in variety, nor less comparatively numerous, than the fossils of the preceding genus. The forms of several species of the fossil madrepores do frequently approach to those of the different recent species; but in a considerable number of the fossil madrepores no resemblance is discoverable, except in their stelliform openings, with any recent coral. So great indeed is this departure in some instances from the general characters of our present known madrepores, that it has been deemed difficult to determine, whether some fossil specimens should be considered as madrepores or as alcyonies. It is impossible, without the aid of numerous figures, to give satisfactory notions of the forms of the several fossil madrepores which have been hitherto discovered; the most interesting only will therefore be here particularized.

The madrepores consisting of a single star appear to be much more numerous in a mineral than in a recent state. These are either of a disccidal form, having a concave superior and a convex inferior surface; of a pyramidal top-like form, terminating in a pedicle; or of a lengthened pyramidal form, bearing in some, from a slight curvature, the appearance of the horn of an animal; whilst others are cylindrical for a considerable part of their length.

The first of these, madrepora porpita, the shirt-button madrepore, has been long known to the collectors of fossils in this kingdom. Dr. Woodward describes several of them, as mycetitæ discoides. The second species (madrepora turbinata) is also frequently found in different parts of Great Britain, as well as in Sweden, Norway, and in several parts of France, Switzerland, and Italy. These latter fossils have been termed by Dr. Woodward mycetitæ conoides seu calyciformes. When they have acquired somewhat of a hornlike shape, they have been distinguished by the term ceratites; and when they have possessed more of the cylindrical form, they have been termed columelli lapidei et hippuritæ; and from a supposed resemblance, they have been also considered as the petrified roots of briony. Some of the single starred corals are found united at their pedicle, and approaching towards each other at their summits, though disjoined nearly through their whole length. These, from their resemblance to petrified reeds, have been named junci lapidei.

It would be useless to attempt, in this sketch, to specify the considerable variety of fossil madrepores formed of aggregated circular stars, and which have been designated as astroites, &c. Those which are composed of angulated stars are, perhaps, not so numerous: many of these, however, are very different in their appearance from those which are known in a recent state. The one most known in these islands is the lithostrotion, sive basaltes striatus et stellatus, of Llwyd. The exact union of the sides of the polygons giving a tolerably correct idea of minute basaltes. The compound madrepores, the stelliform part of which are extended in undulating labyrinthean forms, appear to be much less numerous as fossils than any of the other corals: their existence in a silicious state very rarely occurs.

The millepores do not appear to be nearly as frequently found in a mineral as in a recent state. Several fossils have been placed among the millepores which undoubtedly should rank with the madrepores: such are the millepora simplex turbinata, and the millepora simplex discoides, of Waller and Gesner; a careful examination shewing, that these differ from the porpital and turbinated madrepores, only in their being formed of numerous tubes, possessing an internal stellated structure.

Of the genus isis one species only appears to be known as a fossil. This species was earliest described by Scilla, who at first conjectured it to be the leg-bone of some animal. Specimens are frequently found in the Calabrian mountains, and have lately been also found in some parts of Wiltshire. Of the genera cellepora, antipathes, and Gorgonia, fossil specimens appear to be rather uncommon.

The corallo-fungitæ of Waller are evidently the fossil remains of the alcyony. These have been long described by Volkmann, Scheuchzer, and others, as fossil fruits, and have obtained, from their resemblance to figs, &c. the appellations of ficoides, caricoides, &c.; whilst others of a different form have been named lycoperditæ, fungitæ pileati, &c. A fossil alcyony has even been described by Volkmann and Scheuchzer as a fossil nutmeg.

The encrini and pentacrini have been always, and very properly, considered as the most curious of the fossil zoophytes. The encrinus (Plate LXXX. Nat. Hist.) possesses the distinguishing character of having its spine, or, as it has been generally called, its tail, composed of cylindrical or orbicular vertebræ, pierced through their centre, and marked with diverging striæ on their articulating surfaces. On the superior termination of these is placed the base of the body of the animal, formed of five trapezoidal bodies, termed by Rosinus articuli trapezoides, which inclose five small bodies, which form the center of the base; the whole of these forming that which Rosinus denominated the pentagonal base. From each of these proceed six other bodies, on the two last of each series of which are placed the arms of the animal, which divide into fingers; from the internal surface of these proceed almost innumerable articulated tentacula. This fossil has long possessed the name of the encrinus, or stone lily: its resemblance to that flower having led to the suspicion that it was a petrifaction of a flower, approximating in its form to the lily: its animal origin is however now completely ascertained. Indeed, if a doubt had remained, it would have been removed by the circumstance of the animal membrane, or cartilage, having been actually discovered in the fossil. (Organic Remains of a former World, vol. ii. p. 166.) Several other species of this animal are also described in the work just referred to; but hitherto no recent animal has been found which can be referred to this genus.

The fossil pentacrinus differs from the encrinus, in its vertebræ being of a pentagonal form, and in its arms, fingers, and tentacula being capable of being much more widely spread and extended than are those of the encrinus. It appears from Mr. Parkinson's account, that there are several species of this fossil, the existence of some recent species of which have been also ascertained.

The encrinital vertebræ have been hitherto termed trochitæ when separate, and entrochi when connected in a series. The single vertebra of the pentacrinus have been distinguished as asteriæ,

and when united together they have been termed columnar asteriæ.

Of the asteriæ, or stellæ marinæ, some very few specimens have been found fossil; but they occur very rarely, and have, in general, been found in a condition too imperfect to allow of any positive opinion being formed, respecting the species to which they belong.

The fossil echini are very numerous, upwards of forty species, known only as fossils, being enumerated by the illustrious Linnéus; to delineate, therefore, even those most deserving of notice could not be here well accomplished, a circumstance, however, which is not so much to be regretted, since, through materially different, they approach very nearly in their general form to the recent species. Those which possess a hemispherical, or a nearly orbicular form, with large mamilla-like protuberances, and the anus disposed vertically, have been distinguished as the turban echini (*echini cidares*); those which resemble a shield or buckler in their figure are termed the shield echini (*clypei*, Kleinii); and one of the largest of these has been named the polar stone by Dr. Plot. (Plot's Oxfordshire, p. 91.) When of a depressed circular form, with the anus in the edge of the inferior part, they are the fibulæ of Klein; of a conical form, the eaglestone of the Germans (*conuli*, Kleinii): with a circular base, the quoit echinus (*disco dei*, Kleinii). When the base is an acute oval, the mouth and anus being at the opposite ends, they are termed the helmet echinus, (*cassides et galeæ*, Kleinii); and when heart-shaped, with a sulcated superior surface, they are called snake's hearts (*spatangi*, Kleinii).

The attempt to particularize the various species of fossil shells which have been found would require a large volume: all that can be here done is to notice some of those which totally differ from any which exist in a recent state, and to offer some few remarks on those which approximate, or are perhaps similar to some of the species which are known in a recent state.

With respect to the state in which fossil shells are found, it is necessary to remark, that in some situations, shells which have been buried for ages, by the natural changes which the surface of the earth has undergone, are found very little changed, except from the loss of colour, and having been rendered extremely fragile; that in other situations the substance of the shell has been so injured, as to be reduced to very small fragments, and even to a fine powder, leaving in some instances a stony, correctly moulded, cast of the cavity of the shell; that very frequently the substance of the shell is entirely altered, having become a calcareous stone, or a silicious or pyritous mass, and that the shells of a former world are frequently found in masses of marble, which is called lumachelli, or shelly marble.

Of the multivalves, the chiton does not appear to have been found in a mineralized state: and although several species of lepas have been found in a mineral state, they are by no means frequent fossils. Lepas anserifera is said to have been found fossil, as well as lepas diadema; these must, however, be exceedingly rare fossils.

Fossil shells of the phloas are by no means common; the phloas crispata has been, however, found among the Harwich fossils.

Fossil bivalves are very common fossils; they are, as might be expected, very seldom found in pairs, except when united by a lapideous mass, which prevents the examination of their hinge, or their internal structure, which in many fossil shells are objects highly worthy of examination.

The mya pictorum is described by Solander as existing among our Hampshire fossils: a fossil mya of three or four inches in length is found also in the rocks near Bognor. Remains of the Solen siliqua; and of the Solen ensis, have been found at Harwich, and a small fossil shell, named by Solander Solen ficus, has been found between Lymington and Christchurch.

Fossil shells of the genus tellina, as well as of cardium, mactra, donax, venus, spondylus, chama, arca, and particularly ostrea, have been found of many species. But no bivalve exists as a fossil in such prodigious numbers, and in such various species, as those of the genus anomia. These shells are characterized by the beak of the largest or under valve, which is perforated, being greatly produced, rising or curving over the beak of the smaller or upper valve. Anomia lacunosa is one of the most abundant of these species. They are found in considerable quantities in different parts of England, particularly in Lincolnshire, Warwickshire, and Gloucestershire. Anomia terebratula, is another fossil of this genus, which exists in different counties in this island, in great abundance.

Of the genus mytilus several species are known as fossils, some of which approach very near to those which are known recent: one in particular appears to differ very little indeed from mytilus modiolus. Fossil shells of the genus pinna, in any tolerable state of preservation, are not frequently found: the shells are in general so fragile as to render it very difficult to obtain them tolerably perfect; or so that but little information can be yielded respecting the species to which they belong.

No fossil shell appears yet to have been found which can with certainty be placed under the genus argonauta. But of the genus nautilus, specimens are very frequent. These have been found in several parts of this island: some very fine specimens have been found at Lime in Dorsetshire, in different parts of Wiltshire, and at Whitby in Yorkshire. The finest specimens are perhaps found in the neighbourhood of Bath, and in the isle of Sheppey in Kent, at which latter place they are found exceedingly large, and still retaining a resplendent pearly shell.

The cornu ammonis, which, if we except the extremely minute shells of this kind which have been seen by Plancus, and others, in the sea sand on the Venetian shores, may be said to be only known to us in a fossil state.

Like the nautilus, the cornu ammonis is divided into compartments, by regularly disposed partitions, and these partitions are perforated, as are those of the nautilus, although it is by no means easy to point this out, except in very few specimens.

There are none of the fossil shells, except perhaps the anomiæ, which can vie in the variety of their species with the cornu ammonis. The shell of some is perfectly smooth over its whole surface; in others smooth at the sides, but ridged or beset with spines at the back; and others, though smooth at the side, are crenulated at the back. The species most commonly met with have the shell variously ridged; some with small close striæ, and others with large and round ridges. In some the ridges are single, in others bifurcated, and in others trifurcated. In some, and these are least common, the shell is tuberculated: these tuberculæ differing considerably in different

species, in their size, form, and disposition. The different species proceeding from the intermixture of all these varieties, it must be obvious, must be exceedingly numerous: Scheuchzer was able to determine the existence of one hundred and forty-nine species. The difference of size observable in these fossils is not less remarkable than the variety of their forms, some being found not much larger than the head of a pin, whilst others have been found as large as the top of a small table.

A peculiar appearance is observable on the surface of many of these fossils, which depends on the peculiar form of the septa which separate the chambers of the shell. These septa in the nautili are smooth, and terminate at the surface of the shell in a straight line; but in the cornua ammonis they become undulated as they extend outwardly; and in some so much so as to form, on the outer surface, deeply crenulated lines, giving the appearance of foliaceous sutures. When the cavities of the shell have become filled with stone, and the septa just mentioned have been removed, as is frequently the case, by some chemical agent, the casts formed in the chambers separate, each forming a curious figured stone; these separate casts have been termed spondylolites. By the junction of these are formed the foliaceous sutures above-mentioned. The cornua ammonis were formerly called serpent-stones; the appearance which they yield of a serpent coiled having led the vulgar to consider them as petrified serpents.

The fossil cones are very few when compared with the numerous species known in a recent state: the same may be also said of the cypræa. In both these genera the species are mostly made out more from the colour and the markings of the shells, than from the peculiarities of their form; but in the fossil shells the colours no longer exist, and of course the species in these can very seldom be presumed. The fossil volutes, as far as can be judged from their form alone, differ generally from the recent species. With respect to the genus buccinum, strombus, and murex, the number of species of the fossil shells do not appear to equal those which are known in a recent state. This is the case also, in a still greater degree, with the genus trochus. The fossil shells of the genus turbo are pretty numerous, and some of them very closely resemble those of known recent species. One fossil shell of this genus is very remarkable for its vast size, being upwards of a foot in length. The cast of another species is so large as to weigh four or five pounds. Nothing like this occurs with respect to the species of the genus helix: the fossil shells of this genus very much resemble those which are recent, and are not found of any considerable magnitude. The fossil shells of the genus nerita by no means display so many species as the recent; but some of the fossil species far exceed the recent in size, and one in particular is twelve times the size of any known recent species. Of the genus haliotis, it is not positively determined that a single shell has been seen, which could be considered as fossil. Fossil shells of the genus patella are by no means common. Several species have, however, been found in France, in a state of excellent preservation. Some few also have been found in the cliffs at Harwich, and others, of a different species, imbedded in the lime-stone of Gloucestershire. Dentalia, apparently similar to existing species, have been found in Hampshire, and in some parts of France and Italy, exceedingly well preserved. In Italy also have been found specimens of serpulæ, very similar to those which are known recent; but others have been found in France exceedingly different from any known recent species.

The orthoceratites, a lapidified conical or cylindrical chambered shell, the septa dividing the chambers of which are perforated like those of the nautilus, is a genus of which not a species is known in a recent state, excepting the microscopic specimens found by Plancus in the sand of the Riminian shore. Much is wanting to complete the history of this fossil, since from the state in which the specimens have in general been found, very few, or perhaps none, have been obtained perfect. Authors have divided them into those which are straight, and those which have a spiral termination, the latter of which are considered as fossil shells of the nautilus lituus; but the extraordinary disparity of size is sufficient to shew that they can hardly be considered of the same species, the recent shell being seldom more than an inch in length, whilst the fossil is described as being sometimes the size of a man's arm.

The belemnite is a spathose radiated stone, generally conical, but sometimes possessing a fusiform figure, and contains, in an appropriate cavity at its larger end, a smaller calcareous body (*alveolus*) which has evidently been a concamerated shell, the septæ of which are pierced like those of the preceding fossil. These fossils are from an eighth of an inch to two inches in thickness, and from an inch to a foot and a half in length. They are sometimes found imbedded in chalk or limestone, and sometimes in pieces of flint; but they are most frequently detached from their matrix. Various have been the opinions respecting this fossil: some have considered it as the horn of a narwhal, and others as a concretion formed in the pennicilla marina, or in some shell of the dentalium kind. Some have even supposed it to be of vegetable origin, whilst others have considered it as entirely belonging to the mineral kingdom. But that the belemnite originally existed in the sea, is evident from its being commonly found with the remains of the undoubted inhabitants of the ocean, and that it is of an animal nature, is rendered evident by its structure. Among the concamerated fossil shells may be placed the helicites, or nummular, or lenticular stones. These are round flattish bodies; but in general of a lenticular form, both sides possessing a slight degree of convexity. On each side are sometimes seen traces of its internal structure and of its spiral formation; whilst sometimes these appearances appear to be concealed by a thicker covering. Various opinions have been entertained respecting their origin, but no doubt can exist of their having existed in the ancient ocean as a spiral chambered shell, and of their being one of those species of animals which are now lost.

Among the fossil shells which can only be here enumerated, are the rare tuberculated turrilite, or chambered turbinated shell, the orbulites, planulites, and baculites of Lamarck.

Insects of the smaller kinds are seldom found in a fossil state, the smallness of their size, and the delicacy of their structure, most probably preventing their preservation. Those which are in a state to allow any thing of their general form to be made out are consequently very few. The one which is generally found in the most perfect

condition, is that which is generally known to us as the Dudley fossil, from its being found in the neighbourhood of Dudley, in Worcestershire. Other species of this animal have been found in Wales, and in different parts of Germany. From the imperfect state in which these insects are found, little more, perhaps, can be said of them, except that the remains which have been examined shew that the covering of their body was formed by three series of thick crustaceous plates, transversely disposed in rows, the length of the body; whilst one plate served to give a covering to the head of the animal. Other remains of the smaller insects have been mentioned by different authors; but few or none appear to have been described as agreeing with any insect now known to be in existence.

The remains of lobsters and crabs are frequently found in the isle of Sheppey, and Malta. The remains of different species of these animals are also found in a compressed state in the margaceous and schistous masses of Pappenheim and Oppenheim.

The fossil remains of amphibia are very numerous, and supply us with ample exercise for inquiry and admiration. In different parts of England, particularly in Somersetshire and Dorsetshire, the remains of animals apparently of the lacerta genus are frequently found; but are, as far as we are able to judge, really different from any animal which is known to us. But in no part of the world have such exquisitely fine and wonderful remains of animals of this description been found as in St. Peter's mountain near Maestricht. A most beautiful specimen of part of the jaw of the fossil animal of St. Peter's mountain was presented to the Royal Society, by professor Camper, and is now very properly exhibited in the British Museum. A wonderful specimen of the head of this animal has been also obtained from the same mountain by Faujas St. Fond; and is delineated in the elegant work which he has given to the world, descriptive of the fossil riches of that mountain. Histoire Naturelle de la Montagne de Saint-Pierre de Maestricht.

The plates of St. Fond, as well as the specimen of professor Camper, show that these are the remains, indubitably, of an enormous animal, different from any at present known. It must, however, be observed, that the remains of crocodiles, apparently of the same species which now exist, have also been discovered. part of the head of the Asiatic crocodile was found in very good preservation in the quarries of Altdorff.

Fossil fishes have been found imbedded in calcareous and argillaceous masses, in various parts of Germany, Switzerland, and Italy; but no where in such prodigious numbers as in the mountain named Vestena-Nuova, generally called Monte Bolca, in the Veronese; which extends in height a thousand feet above the quarry, in which are found the numerous remains of fishes; of which, specimens are to be seen in almost every cabinet of repute in Europe. The vestiges of fishes, from an inch to upwards of three feet in length, are found in these quarries, and of these several whose living analogues are said to exist in the neighbourhood of Japan, and of Brazil, occur also in Africa and America. The Abbé Fortis is of opinion that the actual descendants of the Veronian fossil fishes are now to be found in the sea which washes the shores of Otaheite. In Cerigo, (Cytherea) Alessano, Legina, in Dalmatia, Oeningen, Pappenheim, in Aix, and in several parts of France, fossil fishes are found in very excellent preservation. In England fossil fishes are much more rarely found than in France, Germany, or Italy.

The fossil fishes of Vestena Nuova are supposed to prove, from several circumstances, that their privation of life was sudden; some having been discovered with the head of their prey still in their mouths; and others with the remains of the fish, which they had devoured, still in their stomachs.

The fossil remains of birds are very rarely found; although frequently mentioned and even described by different authors. Fossils very much resembling the beaks of birds are sometimes found; but these are much more probably parts of fishes. Several of those specimens which have been spoken more positively of, as petrifactions of whole birds, and of their nests, have been merely calcareous incrustations of very modern formation. Bones very much resembling the bones of birds have been found in the calcareous stone of Oxfordshire, and in some parts of France, and of Germany.

The fossil remains of quadrupeds, especially those of the larger kind, are such as must necessarily excite the attention and wonder of every curious inquirer in natural history. In various parts of this country have been traced the remains of elephants, and of other animals of considerable magnitude. In Ireland have been found the remains of deer, of a size far exceeding any now known; and in Scotland have been found the remains of the elk, as well as those of an enormous animal of the ox kind, but larger than even the urus. In France, Germany, Italy, and indeed in most parts of Europe, remains of large animals have been found, and in both North and South America the remains of enormous unknown animals. According to Pallas, from the Tanais to the continental angle nearest to America, there is hardly a river in this immense space, especially in the plains, upon the shores or in the bed of which have not been found the bones of elephants and of other animals not of that climate. From the mountains by which Asia is bounded, to the frozen shores of the ocean, all Siberia is filled with prodigious bones; the best ivory (fossil) is found in the countries nearest to the arctic circle, as well as in the eastern countries, which are much colder than Europe, under the same latitude; countries where only the surface of the ground becomes thawed during summer.

The number of bones which have been discovered of the rhinoceros is very considerable, not only in Siberia, but in Germany, and in other parts of Europe: and in the opinion of St. Fond, founded not only on the discoveries of Pallas and others, but on his own observations made on the immense collection of Merck, joined with that of the landgrave of Hesse Darmstadt, are of the species with double horns. An entire body of an animal of this species, still possessing the skin, fat, and muscles, has been dug up near the river Willioni, in the eastern part of Siberia, from under a hill, which is covered with ice the greatest part of the year. St. Fond states, in confirmation of the above opinion, that another head obtained by Pallas from Siberia; one existing in the cabinet of the elector of Manheim; and another in the cabinet of Merck, are all apparently similar to the head of the double-horned rhinoceros of Africa.

This circumstance, so contradictory to the opinion he had formed, of these remains of large animals having been brought by floods from the eastern parts of the globe; and which opinion was

confirmed by discovering that no remains of the African crocodile had been traced in Europe; led him to further research, by which he found reason to suppose that, in fact, the rhinoceros, which corresponded with all the fossil remains which he had seen, was the rhinoceros of Sumatra. By ascertaining this circumstance the difficulty was removed, since Sumatra being separated from the peninsula of India merely by the straits of Malacca, this animal might also have formerly existed there.

Much awaits to be ascertained with respect to fossil remains of elephants, of which considerable numbers have been found in various parts of England, France, Germany, and Italy; but no where so abundantly as in Siberia. In America, indeed, the remains of an unknown species of this animal are also very abundant. There appears to be only two species of elephants now in existence; one (the Asiatic) being distinguished by its grinders being divided into transverse and nearly parallel plates, and the other (the African) having these plates disposed in lozenge-like forms.

The elephantine remains which have been found in Siberia have been supposed to have belonged to no existing species; for though the teeth are formed of plates disposed parallel to each other, as in the Asiatic, these plates are said to be thinner, and consequently more numerous; but this distinction is by no means established. The remains of elephants discovered in this country seem referable, in most instances, to the Asiatic.

With respect to the elephant whose remains have been found in America, the tooth of which differs essentially from all known fossil or recent species, in having its crown cuspidated and covered with enamel, there exists at present every reason for supposing it to be of a species now extinct. The generally adopted opinion that this animal was of a carnivorous nature is by no means established; but is indeed contradicted by the assertion that the stomach of one of these animals has been found filled with vegetable matter. One of these animals, with its flesh, skin, and hair, has been lately found in Siberia.

The remains of an animal of an enormous size has been found at Paraguay, at no great distance from the river Plata, which being properly arranged, has been formed into a skeleton and placed in the cabinet of natural history at Madrid. This animal, twelve feet in length and six in height, is distinguished, as well as by its general form, by the largenesss of its claws; on which account, Mr. Jefferson, who has described some remains of a similar animal in the Philosophical Transactions of Philadelphia, has named it the megalonyx. The celebrated Cuvier has arranged this animal with the sloths; but Faujas St. Fond, concluding that an animal so enormous was never intended to climb the trunks of trees, thinks he should not be thus classed; and wishes him to be held, as it were, in reserve, until some discoveries should supply us with more satisfactory notions respecting its nature.

In various parts of Scotland, and of France; in Tuscany, the Veronese, and in North America, have been found the fossil remains of some animal which has been supposed to be a variety of the urus of Julius Cæsar, or of the bison. But these horns, which are of very considerable size, the base of each horn exceeding two feet in length, seem to have belonged to a different species of animal from any which is at present known. The observations which have been made on these fossils, particularly by the liberal and industrious Faujas St. Fond, give great reason for believing that two species of animals have existed bearing horns of this enormous magnitude. These remains are found to exist in Siberia along with the bones and horns of the rhinoceros, and with bones and teeth of the mammouthean elephant of Siberia.

To the fossil remains already mentioned may be added the animal incognitum of Symore in Languedoc; the enormous elk found in the mosses of Ireland; the gigantic tapir, found at the bottom of the black mountains of Languedoc; the bears, of two species, now unknown, found in Bareith; and the numerous animals of unknown species, which the indefatigable Cuvier is perpetually discovering in that mine of fossils, the quarries of gypsum near Paris.

This excellent writer will not allow the mammoth to belong in any respect to the elephant family; he refers it to a different genus, which he has named mastodonton. In the third volume of the Annales, he gives an account of bones which he had found included between the strata of gypsum, in the above plaster quarries, which after a very ample detail of the head, the various parts of which he had been enabled perfectly to replace, he concludes that no well-informed naturalist would deny that these bones belonged to an herbivorous animal of the order of pachydermata (formed from the bruta and belluæ of Linnéus), and of a genus between the tapir and the rhinoceros. As little could he deny, says he, that no such animal has yet been discovered among the living tribes on the surface of the earth. He gives to this genus the name of palæotherium, expressive of its great antiquity. Further research into the remains of which the plaster quarries about Paris contain so many specimens enabled him to discover another genus similar to the former, but without canine teeth, which he has distinguished, indicating this inoffensive structure anoplotherium. In each of these genera he distinguished several species, as the magnum, medium, minus, commune. It is very extraordinary, therefore, that while the whole order of known pachydermata, or thick-skinned quadrupeds, amount to not more than six, the elephant, tapir, hog, hippopotamus, daman, and rhinoceros, we should already have traced out three genera that are lost, the palæotherium, anoplotherium, and mastodonton, besides various species, of the mineralized remains of man no well-attested instance is known. In a cavern, indeed, in the Mendip hills, some human bones have been found invested with stalactite; but these appear to be but of modern existence. Scheuchzer published an essay describing a supposed skeleton of a man, which was undoubtedly the remains of some large fish.

It appears obvious, however, from what has actually been discovered, that a considerable number of species, kinds, and perhaps orders, of animal, vegetable, and mineral materials, have been lost for ages, and consequently that the general state and inhabitants of the earth have undergone some very remote and very considerable change: and it appears equally obvious that such change must have been produced by some such event as the Noachic deluge, the book of nature thus bearing evidence to the truth of the book of revelation. And nothing moreover is clearer than, judging from the general nature of the fossil materials of the antidiluvian world which have reached us, or at least are known to have reached

us, that the postdiluvian world has a very high comparative advantage, is actually richer, and to a considerable extent, in valuable productions, and is much more fitted for the necessaries and even the comforts and luxuries of civilized life. The direct conclusion of these remarks then is, that independently of the accomplishment of any other important purpose, by the revolution of a former world, one grand object appears to have been attained; such a modification and arrangement of the seeming ruin as produced the regeneration of a world stored, in its deepest recesses, with substances calculated to promote the comfort of man; to tempt him to the exercise of his innate powers; to furnish him with the means of maintaining his dominion over the animals around him; and even to urge him to a change from the savage to a civilized state. Another world rises from the overwhelming flood, composed of the fragments of the former, which appear to be blended together, in an apparently disordered and incongruous mass. But after the lapse of a small period of time the constituent parts of the newly-formed world are discovered to be arranged according to those wise laws which the great Creator had decreed from the beginning. The surface again teems with animal and vegetable life; and the fresh creation, enriched by the amelioration of its materials, obtains an increase both in its stock of utility and beauty. (See Natural History, Plates LXXX. LXXXII. LXXXIV. CVIII. CXIII. CXV. For all which we are indebted to the liberality of Mr. Parkinson.

ORYZA. Rice. In botany, a genus of the class hexandria, order digynia. Calyx, glume two-valved, one-flowered; corol two-valved, nearly equal, growing to the seeds. One species, supposed to be a native of Ethiopia, but now propagated in different parts of the four quarters of the globe. It affords many varieties, of which the following are the chief.

α Common rice: cut six or eight months after planting.
β Early rice: ripens and is cut the fourth month after planting.
γ Dry or mountain rice: the paddy of the Hindus; grows in mountains and other dry soils.
δ Clammy rice: with large, glutinous, very white seeds; will grow well in both dry and moist soils.

These plants may be increased by seeds in the early parts of spring. The seeds should be sown in a hot-bed, and when the plants appear, they should be transplanted into pots filled with rich light earth, and placed in pans of water which should be plunged into a hot-bed; and as the water wastes it must be renewed from time to time. The plants must be preserved in a stove all the summer; when towards the end of August they will produce grain, which will ripen tolerably well, provided the autumn prove favourable.

It is probable, however, that the mountain-rice, which endures a very considerable degree of cold on the tops of the loftiest hills of Hindu, and grows in the midst of snow, might be naturalized to our own climate.

Rice is the principal food of the inhabitants in all parts of the East; where it is boiled and eaten, either alone or with their meat. Large quantities of it are sent annually into Europe, and it meets with a general esteem for family purposes. The Javanese have a method of making puddings which seems to be unknown here, but which is not difficult to be practised. They take a conical earthen pot which is open at the large end, and perforated all over: this they fill about half full with rice, and putting it into a larger earthen pot of the same shape, filled with boiling water, the rice in the first pot soon swells, and stops the perforations so as to keep out the water; by this method the rice is brought to a firm consistence, and forms a pudding, which is generally eaten with butter, oil, sugar, vinegar, and spices. The Indians eat stewed rice with good success against the bloody flux; and in most inflammatory disorders they cure themselves with only a decoction of it. The spirituous liquor called arrack is made from this grain. Rice grows naturally in moist places: and will not come to perfection, when cultivated, unless the ground be sometimes overflowed, or plentifully watered. The grain is of a grey colour when first reaped; but the growers have a method of whitening it before it is sent to market. The manner of performing this, and beating it out in Egypt, is thus described by Hasselquist. They have hollow iron cylindrical pestles about an inch diameter, lifted by a wheel worked with oxen. A person sits between the pestles, and, as they rise, pushes forward the rice, whilst another winnows and supplies fresh parcels. Thus they continue working until it is entirely free from chaff. Having in this manner cleaned it, they add one-thirtieth part of salt, and rub them both together, by which the grain acquires a whiteness; then it is passed through a sieve, to separate the salt again from it. In the island of Ceylon they have a much more expeditious method of getting out the rice; for in the field where it is reaped they dig a round hole, with a level bottom, about a foot deep, and eight yards diameter, and fill it with bundles of corn. Having laid it properly, the women drive about half a dozen oxen continually round the pit; and thus they will tread out forty or fifty bushels a day. This is a very ancient method of treading out corn, and is still practised in Africa upon other sorts of grain.

OS. See Bone and Mouth.

OSACA, a large town of the island of Niphon, in Japan, with a magnificent castle. It has a harbour, and is one of the most commercial places of Japan. The hours of the night are proclaimed by the sound of different instruments of music. Lon. 133. 45 E. Lat. 35. 20 N.

OSBECHIA, in botany, a genus of the class octandria, order monogynia. Calyx four-cleft, with a ciliate scale between the lobes; corol four-petalled; anthers beaked; capsule inferior, four-celled, surrounded by the truncate tube of the calyx. Two species; natives of Ceylon and China.

OSCHATZ, a town of Upper Saxony, in

the margravate of Meissen, which has some manufactures of cloth. It is 16 miles N.W. of Meissen, and 30 N.W. of Dresden. Lon. 13. 24 E. Lat. 51. 24 N.

OSCHEOCELE. See Hernia.

OSCHOPHORIA, a festival observed by the Athenians. It received its name ἀπὸ τοῦ φέρειν τὰς ὄσχας, from carrying boughs hung up with grapes, called ὄσχαι. The origin of this festival is given at considerable length in Plutarch's life of Theseus, who first instituted it.

OSCI, a people between Campania and the country of the Volsci, who assisted Turnus against Æneas. Some suppose that they are the same as the Opici. (*Virg.*).

OSCILLA, small images of wax or clay made in the shape of men or women, and consecrated to Saturn, to render him propitious. The word is sometimes used to signify a kind of masks scooped from the bark of trees, and worn by the performers of comedy in the ruder ages of Rome. In this sense we find it in Virg. Geo. ii. 386. It also signifies little heads or images of Bacchus, which the countrymen of old hung upon trees, that the face might turn every way, out of a notion that the countenance of this god gave felicity to themselves, and fertility to their vineyards. An allusion to this opinion and custom is also found in Virgil, Geo. ii. 388.

OSCILLATION. *s.* (*oscillum*, Latin.) The act of moving backward and forward like a pendulum.

Oscillation, in mechanics, the vibration, or reciprocal ascent and descent of a pendulum. See Pendulum.

It is demonstrated, that the time of a complete oscillation in a cycloid, is to the time in which a body would fall through the axis of that cycloid, as the circumference of a circle to its diameter; whence it follows, 1. That the oscillations in the cycloid are all performed in equal times, as being all in the same ratio to the time in which a body falls through the diameter of the generating circle. 2. As the middle part of the cycloid may be conceived to coincide with the generating circle, the time in a small arch of that circle will be nearly equal to the time in the cycloid; and hence the reason is evident, why the times in very little arches are equal. 3. The time of a complete oscillation in any little arch of a circle, is to the time in which a body would fall through half the radius, as the circumference of a circle, to its diameter; and since the latter time is half the time in which a body would fall through the whole diameter, or any chord, it follows that the time of an oscillation in any little arch, is to the time in which a body would fall through its chord, as the semicircle to the diameter. 4. The times of the oscillations in cycloids, or in small arches of circles, are in a sub-duplicate ratio of the lengths of the pendulums. 5. But if the bodies that oscillate are acted on by unequal accelerating forces, then the oscillations will be performed in times that are to one another in the ratio compounded of the direct subduplicate ratio of the lengths of the pendulums, and inverse subduplicate ratio of the accelerating forces. Hence it appears that if oscillations of unequal pendulums are performed in the same time, the forces accelerating these pendulums must be as their lengths; and thus we conclude, that the force of gravity decreases as we go towards the equator, since we find that the lengths of pendulums that vibrate seconds are always less at a less distance from the equator. 6. The space described by a falling body in any given time, may be exactly known; for finding, by experiments, what pendulum oscillates in that time, the half of the pendulum will be to the space required, in the duplicate ratio of the diameter of a circle to the circumference. 7. If the length of a pendulum be $39\frac{1}{8}$ inches, it will perform one oscillation in a second, in the latitude of London.

Oscillation (Centre of). See Centre.

OSCILLATORY. *a.* (*oscillum*, Latin.) Moving backward and forward like a pendulum (*Arbuthnot*).

O'SCITANCY. *s.* (*oscitantia*, Latin.) 1. The act of yawning. 2. Unusual sleepiness; carelessness (*Addison*).

O'SCITANT. *a.* (*oscitans*, Latin.) 1. Yawning; unusually sleepy. 2. Sleepy; sluggish (*Decay of Piety*).

OSCITATION. *s.* (*oscito*, Latin.) The act of yawning (*Tatler*).

OSCULA, in anatomy, a term used for the orifices, or openings of the lesser vessels.

OSCULATION, in geometry, is used for the contact between any given curve and its osculatory circle; that is, the circle of the same curvature with the given curve. See Curvature, and Curve.

OSCULATORY CIRCLE, in geometry, is used chiefly by foreign mathematicians for the circle of curvature; that is, the circle having the same curvature with any curve at any given point. See Curvature.

Osculatory parabola. See Parabola.

Osculatory point, the point of contact between a curve and its osculatory circle. See Curvature.

OSERO, or Osoro, an island in the gulf of Venice, belonging to the Venetians, having that of Cherso to the N. to which it is joined by a bridge. The capital is of the same name, with a bishop's see. Lon. 15. 30 E. Lat. 45. 0 N.

OSEY, an island in Blackwater Bay, near Malden, in Essex. It is covered with wild fowl at certain seasons; and here the coal ships for Malden unload their cargoes.

OSIANDRIANS, a sect among the Lutherans, so called from Andrew Osiander, a celebrated German divine.

Their distinguishing doctrine was, that a man is justified formally, not by the faith and apprehension of the justice of Jesus Christ, or the imputation of our Saviour's merits, according to the opinion of Luther and Calvin; but by the essential justice of God.

Osiandrians (Semi,) were such among the Osiandrians, as held the opinion of Luther and Calvin with regard to this life; and that of Osiander, with regard to the other; asserting, that man is justified here by imputation; and hereafter by the essential justice of God.

OSIER, in botany. See Salix.

OSIMO, an ancient town of Italy, in the marquisate of Ancona, with a rich bishop's see, and a magnificent episcopal palace.* It is seated on the Musone, 10 miles S. of Ancona, and 110 N.E. of Rome. Lon. 13. 34 E. Lat. 43. 29 N.

OSIRIS, a great deity of the Egyptians, son of Jupiter and Niobe. The ancients greatly differ in their opinions concerning this celebrated god, but they all agree that as king of Egypt, he took particular care to civilize his subjects, and to teach them agriculture. After he had accomplished a reform at home, Osiris resolved to go and spread civilization in the other parts of the earth. He left his kingdom to the care of his wife Isis; and in his expedition was accompanied by his brother Apollo, and by Anubis, Macedo, and Pan. His march was through Ethiopia. He afterwards passed through Arabia, and visited the greatest part of the kingdoms of Asia and of Europe, where he enlightened the minds of men by introducing among them the worship of the gods, and a reverence for the wisdom of a Supreme Being. At his return home, Osiris found the minds of his subjects agitated. His brother Typhon, who had raised seditions, murdered him in a secret apartment, and cut his body to pieces, which he divided among the associates of his guilt. This cruelty incensed Isis; she revenged her husband's death, and with her son Orus she defeated Typhon, and the partizans of his conspiracy. She recovered the mingled pieces of her husband's body, the genitals excepted, which the murderer had thrown into the sea. Isis then directed the different Egyptian priests to choose whatever animals they pleased to represent the person and the divinity of Osiris, and they were enjoined to pay the greatest reverence to that representative of divinity, and to bury it when dead with the greatest solemnity. To render their establishment more popular, each sacerdotal body had a certain portion of land allotted to them to defray the expences attending the ceremonial rites. That part of the body of Osiris which had not been recovered was treated with more particular attention by Isis. (See Phallica.) As Osiris had particularly instructed his subjects in cultivating the ground, the priests chose the ox to represent him, and paid the most superstitious veneration to that animal. (See Apis.) Osiris, according to the opinion of some mythologists, is the same as the sun, and the adoration which is paid by different nations to an Anubis, a Bacchus, a Dionysius, a Jupiter, a Pan, &c. is the same as that which Osiris received in the Egyptian temples. Nothing can give a clearer idea of the greatness of Osiris than this inscription found on some ancient monuments: "Saturn, the youngest of all the gods, was my father: I am Osiris, who conducted a large and numerous army as far as the deserts of India, and travelled over the greatest part of the world, and visited the streams of the Ister and the remote shores of the ocean, diffusing benevolence to all the inhabitants of the earth."

OSMITES, in botany, a genus of the class syngenesia, order polygamia frustranea. Receptacle chaffy; seeds with hardly any crown; florets of the ray ligulate; calyx imbricate, scarious. Four species; shrubs of the Cape.

OSMIUM, a metal obtained from the ore of platina. See Platinum.

OSMUNDIA. Moon-wort. In botany, a genus of the class cryptogamia, order filices. Fructification crowded, nearly globular, pedicelled, disposed in a raceme or on the back of the frond, one-celled, two-valved. Sixteen species, which may be thus subdivided into equal numbers.

A. Stems bearing racemes at the base of the frond.

B. Racemes on distinct scapes.

C. All the fronds fertile.

D. Fertile distinct fronds.

All exotics except O. regalis, osmond royal, or flowering fern; frond bipinnate; raceme terminal, more than decompound. Common to our putrid marshes. The root boiled in water is gelatinous, and is used in the north to stiffen linen instead of starch.

OSNABURG, a bishopric of Germany, in the circle of Westphalia, 40 miles long and 30 broad. It is remarkable that this bishopric is possessed by papists and protestants alternately, according to the treaty of Westphalia. The protestant bishop is chosen by the house of Brunswick Lunenburg, and the catholic by the papists. The present bishop is Frederic duke of York, second son of the king of Great Britain. The inspection and administration of ecclesiastical affairs, however, belong to the elector of Cologne, as metropolitan.

Osnaburg, a city of Germany, capital of a bishopric of the same name, with a university, and a castle. It is remarkable for a treaty of peace concluded between Germany and Sweden, in 1648, in favour of the protestant religion. The protestants have two of the churches. The beer of this place is highly esteemed in Germany. It is seated on the Haze, 35 miles N.E. of Munster, and 75 W. of Hanover. Lon. 8. 20 E. Lat. 52. 24 N.

Osnaburg, an island in the S. Pacific Ocean, discovered and named by captain Wallis, in 1767. It is called Miatea by the natives. Lon. 147. 30 W. Lat. 17. 51 S.

OSPREY, in ornithology. See Falco.

OSSA, a lofty mountain of Thessaly. It was formerly joined to mount Olympus, but Hercules, as some report, separated them, and made between them the celebrated valley of Tempe. Ossa was one of those mountains which the giants, in their wars against the gods, heaped up one on the other, to scale the heavens with more facility.

Ossa spongiosa. In anatomy, the spongy

bones two in number, called also ossa spongiosa inferiora. The ethmoid bone has two turbinated portions, which are sometimes called the superior spongy bones. These bones, which from their shape are sometimes called ossa turbinata, have by some anatomists been described as belonging to the ethmoid bone; and by others, as portions of the ossa palati. In young subjects, however, they are evidently distinct bones. They consist of a spongy lamella in each nostril. The convex surface of this lamella is turned towards the septum narium, and its concave part towards the maxillary bone, covering the opening of the lachrymal duct into the nose. From their upper edge arise two processes: the posterior of these, which is the broadest, hangs as it were upon the edge of the antrum Highmorianum; the anterior one joins the os unguis, and forms a part of the lachrymal duct. These bones are complete in the fœtus. They are lined with the pituitary membrane; and, besides their connection with the ethmoid bone, are joined to the ossa maxillaria superiora, ossa palati, and ossa unguis. Besides these ossa spongiosa inferiora, there are sometimes two others, situated lower down, one in each nostril. These are very properly considered as a production of the sides of the maxillary sinus turned downwards. In many subjects, likewise, we find other smaller bones, standing out into the nostrils, which, from their shape, might also deserve the name of turbinata, but they are uncertain in their size, situation, and number.

OSSETIA, the country of the Ossi, or Osseti, one of the seven Caucasian nations, between the Black Sea and the Caspian; bounded on the N. by great Cabarda, on the E. by the Lesguis Tartars, and on the S. and W. by Imeritia. It contains 19 districts, of which one is subject to Imeritia, and the others to Georgia. These districts are of very unequal size; some containing only five, and others 50 villages, each of which comprises from 20 to 100 families. Their language has some analogy with that of the Persian. Their history is entirely unknown. The Circassians and Tartars call them Kusha.

OSSIAN, son of Fingal, an ancient Scotch bard, who flourished about the beginning of the third century. He accompanied his father in his wars, and in the latter part of life, which was protracted to a good old age, he became blind. In 1758 some poems appeared in a poetical style, said to be translated from the original Gaelic of Ossian, by Mr. Macpherson; and as they excited the attention of the learned by their beauty, they produced an animated controversy respecting their authenticity. Into this we cannot here enter; but must refer the reader to the disquisitions of Dr. Blair, Dr. Johnson, lord Kames, &c. if he have not already come to a decision on this point.

OSSICLE. *s.* a small bone.

OSSICULA AUDITUS. The small bones of the internal ear are four in number, viz. the malleus, incus, stapes, and os orbiculare; and are situated in the cavity of the tympanum. See MALLEUS, INCUS, STAPES, and ORBICULARE OS.

O'SSIFIC. *a.* (*ossa* and *facio*, Lat.) Having the power of making bones, or changing carneous or membranous to bony substance (*Wise.*).

OSSIFICATION. (*ossificatio*, from *os*, a bone, and *facio*, to make). See BONE.

OSSIFRAGA. (*ossifraga*, from *os*, a bone, and *frango*, to break). A petrified root, called the bone binder, from its supposed virtues in uniting fractured bones.

OSSIFRAGUS. See OSTEOCOLLA.

To OSSIFY. *v. a.* (*ossa* and *facio*, Latin.) To change to bone (*Sharp*).

OSSI'VOROUS. *a.* (*ossa* and *voro*, Latin.) Devouring bones (*Derham*).

OSSLETS. In the veterinary science, little hard substances that arise amongst the small bones of a horse's knee, on the inside. They grow out of the substance which connects those bones together, and arise from strains while a horse is young, before his joints are well knit. They are not common, however; and if observed in the beginning, a little oil of origanum rubbed on the part every other day will dissolve them: but if they are of long continuance, they require firing, which is the most certain method to effect a cure.

OSSORY, the western division of Queen's county, in Ireland.

O'SSUARY. *s.* (*ossuarium*, Lat.) A charnel-house; a place where the bones of dead people are kept.

OSSUNA, an ancient and considerable town of Spain, in Andalusia, with a university, 40 miles E. of Seville. Lon. 4. 31 W. Lat. 37. 24 N.

OSTADE (Adrian Van), a Dutch painter, born at Lubec, 1610. He was endued with such powers by nature, that he equalled all other painters in the representations of droll and vulgar scenes. He perfectly understood the chiaro-obscura, and his smoaking rooms, alehouses, kitchens, and stables, are particularly admired. He died at Amsterdam, 1685, much regretted.

OSTEITES, (οστιτης, from οστεον, a bone). The bone binder. See OSTEOCOLLA.

OSTEND, a fortified seaport of Austrian Flanders, seated among a number of canals, and almost surrounded by two of the largest of them, into which ships of great burden may enter with the tide. It is famous for the long siege it sustained against the Spaniards, from July 5, 1601, to September 22, 1604, when it surrendered, by an honourable capitulation. On the death of Charles II. of Spain, the French seized Ostend; but, in 1706, after the battle of Ramilies, it was retaken by the allies. It was again taken by the French in 1745, but restored in 1748. In the war of 1756, the French garrisoned this town for the empress queen Maria Theresa. In the last war, as a neutral port, it became a great mart for trade; and it was greatly augmented both in population and buildings. In 1792, the French once more took Ostend, which

they evacuated in 1793, and repossessed in 1794. In May 1798, the English landed a body of troops here, who blew up and destroyed the works of the Bruges canal; but the wind shifting before they could re-embark, they were under the necessity of surrendering to the French. Ostend is 10 miles W of Bruges, 22 N.E. of Dunkirk, and 60 N.W. of Brussels. Lon. 3. 1 E. Lat. 51. 14 N.

OSTE'NSIBLE. *a.* (*ostendo*, Latin.) Such as is proper or intended to be shown.

OSTE'NSIVE. *a.* (*ostentif*, Fr. *ostendo*, Lat.) Showing; betokening.

OSTE'NT. *s.* (*ostentum*, Latin.) 1. Appearance; air; manner; mien (*Shakspeare*). 2. Show; token (*Shakspeare*). 3. A portent; a prodigy (*Dryden*).

OSTENTA'TION. *s.* (*ostentatio*, Latin.) 1. Outward show; appearance (*Shakspeare*). 2. Ambitious display; boast; vain show (*Add.*). 3. A show; a spectacle: not in use (*Shakspeare*).

OSTENTA'TIOUS. *a.* (*ostento*, Latin.) Boastful; vain; fond of show; fond to expose to view (*Dryden*).

OSTENTA'TIOUSLY. *ad.* (from *ostentatious*.) Vainly; boastfully.

OSTENTA'TIOUSNESS. *s.* Vanity; boastfulness.

OSTENTA'TOUR. *s.* (*ostentateur*, Fr.) A boaster; a vain setter to show.

OSTEOCOLLA. (*osteocolla*, οστεοκολλα, from οστεον, a bone, and κολλαω, to glue). Ossifragus. Osteites. Ammosteus. Osteolithos. Stelochites. Bone binder. A particular carbonate of lime, found in some parts of Germany, particularly in the Marche of Brandenburg, and in other countries. It is met with in loose sandy grounds, spreading from near the surface to a considerable depth, into a number of ramifications, like the roots of a tree; it is of a whitish colour, soft whilst under the earth, friable when dry, rough on the surface, for the most part either hollow within, or filled with a solid wood, or with a powdery white matter. It was formerly celebrated for promoting the coalition of fractured bones, and the formation of callus; which virtues are not attributed to it in the present day.

OSTEOCOPUS, (*osteocopus*, οστεοκοπος, from οστεον, a bone, and κοπος, uneasiness.) A very violent fixed pain in any part of the bone.

OSTEOGENY. (*osteogeneia*, οστεογενεια, from οστεον, a bone, and γενεια, generation). The growth of bones. See BONE.

OSTEOGRAPHY. (*osteographia*, οστεογραφια, from οστεον, a bone, and γραφω, to describe.) The description of the bones. See BONE.

OSTEOLITHOS. (*osteolithos*, οστεολιθος, from οστεον, a bone, and λιθος, a stone.) See OSTEOCOLLA.

OSTEOLOGY. (*osteologia*, οστεολογια, from οστεον, a bone, and λογος, a discourse.) The doctrine of the bones. See ANATOMY.

OSTEOSPERMUM. In botany, a genus of the class syngenesia, order polygamia necessaria. Receptacle naked, downless; calyx many-leaved; seeds globular, coloured; bony. Twenty-three species, all Cape shrubs. Those chiefly cultivated are,

1. O. spinosum. Prickly osteospermum.
2. O. pisiferum. Smooth osteospermum.
3. O. moniliferum. Poplar-leaved osteospermum.
4. O. polygaloides. Milk wort osteospermum.
5. O. cæruleum. Blue-flowered osteospermum.

They are all tender plants, for the most part require frequent watering, and should be treated like myrtles.

OSTERODE, a town of Lower Saxony, in the principality of Grubenhagen. Here is a manufacture of woollen stuffs; also a magazine for corn, which is delivered out to the miners of the Hartz forest, always at a fixed price. It is 16 miles S.W. of Goslar. Lon. 10. 33 E. Lat. 51. 50 N.

OSTERODE, a town of Prussia, in the province of Oberland, with an ancient castle, situate on the Dribentz, 65 miles SE. of Dantzic, and 70 SSW. of Konigsberg.

OSTERVALD (John Frederic), a protestant minister, born at Neufchatel, 663. He was learned and pious, and from his friendship with Turretin and Werenfels arose the expression of the triumvirate of Swiss theologians. He died 1747. He wrote a Catechism of the Christian Religion, 8vo; Arguments and Reflections on the Books of the Bible, 2 vols. 8vo; Treatise against Uncleanness, 8vo. &c.

OSTERWIECK, a town of Lower Saxony, in the principality of Halberstadt. It has several woollen manufactures, and is situate on the Ilse, 13 miles W. of Halberstadt, and 15 N.E. of Goslar. Lon. 10. 52 E. Lat. 52. 10 N.

OSTERWYCK (Maria Van), a female painter, born near Delft in 1630, and died in 1693. Her favourite subjects were flowers and still life, which she painted in a delicate manner, with a light pencil, and great freedom of hand.

OSTIA, a once celebrated but decayed seaport of Italy, in Campagna di Roma, seated at the mouth of the Tiber, with a bishop's see: the harbour is choaked up. It is 12 miles S.W. of Rome. Lon. 12. 24 E. Lat. 41 44 N.

OSTIACKS, a people of Siberia in Asia. They live upon the banks of the rivers Oby and Jenisay, and on those of some other rivers which fall into these. These people are very poor, and very lazy, and in the summer-time live mostly upon fish. They are of a middle size, with broad faces and noses, and yellowish or red hair. All their garments from top to toe are made of fish skins, for they have neither linen nor woollen; and indeed they might almost as well go naked. Their greatest diversion is hunting: and they go together in crowds, with a weapon like a large knife fastened in a stick. In summer they take and dry the fish which serves them in winter: and when that season begins, they go into the woods with their bows and arrows, their dogs

and nets, to kill sables, ermines, bears, reindeer, elks, martens, and foxes. Part of the furs of these is paid as a tax to the emperor of Russia, and the rest are sold at a stated price to the Russian governors, but sometimes they are allowed to dispose of them to private persons. The Ostiacks are obliged to take an oath of fidelity to the Russian government; and on these occasions they use the following ceremony. After laying down a bear skin and an axe, and holding over it a piece of bread on a knife, they say, "In case I do not to my life's end prove true and faithful to the supreme government of the country, or if I knowingly and willingly break through my allegiance, or be wanting in the duty I owe to the said supreme government, may the bear tear me to pieces in the wood; may the bread I eat stick in my throat, and choak me; may the knife stab me, and the axe cut off my head." The like ceremony is used among them previous to the deposition of a witness.

OSTIARY. *s.* (*ostium*, Lat.) The opening at which a river disembogues itself (*Brown*).

O'STLER. *s.* (*hostelier*, French.) The man who takes care of horses at an inn (*Sw.*).

O'STLERY. *s.* (*hostelerie*, French.) The place belonging to the ostler.

OSTRACION. Trunk fish. In zoology, a genus of the class pisces, order branchiostega. Teeth round, pointing forward, blunt; aperture of the gills linear; body mailed by a complete bony covering; without ventral fin. Twelve species; chiefly inhabitants of the Indian seas: the most beautiful is O. meleagris, somewhat square, blackish, exquisitely marked with innumerable white spots; from six to eight inches long; inhabits the Southern ocean.

OSTRACISM, in Grecian antiquity, denotes the banishment of such persons whose merit and influence gave umbrage to the people of Athens, lest they should attempt any thing against the public liberty. This punishment was called ostracism, from the Greek word οςρακον, which properly signifies a shell; but when applied to this object, it is used for the billet on which the Athenians wrote the names of the citizens whom they intended to banish. The learned are divided with regard to the substance of which this billet was formed: some insist that it was a small stone, or a piece of brick; some that it was a piece of bark; and others assert that it was a shell. The word admits most of these interpretations. But what determines its true sense is the epithet given it by ancient authors, of *ceramitè mastix*; which words signify, "The punishment of potter's clay:" and this expression seems to us a proof, that the word οςρακον, when applied on this occasion, signifies a piece of baked earth in the form of a shell; and undoubtedly the Latin authors had this idea of the word here, for they translated it by *testula*.

The ancients are likewise divided with regard to the time when ostracism was instituted. But they all agree, that the person who moved the law was its first victim. But as to the name of its patron, and the time of its establishment, they differ extremely. Many are of opinion, that ostracism owes its origin to very remote times.

However that be, the punishment of ostracism was inflicted by the Athenians when their liberty was in danger. If, for instance, jealousy or ambition had sowed discord among the chiefs of the republic; and if different parties were formed, which threatened some revolution in the state; the people assembled to propose measures proper to be taken in order to prevent the consequences of a division which in the end might be fatal to freedom. Ostracism was the remedy to which they usually had recourse on these occasions.

OSTRACITES. Fossil oysters.

OSTREA. Oyster. In zoology, a genus of the class vermes, order testacea. Animal a tethys; shell bivalve, generally with unequal valves, and slightly eared; hinge without teeth, but furnished with an ovate hollow, and, mostly, lateral transverse grooves.

Most of this genus are furnished at the hinge internally with numerous parallel internal grooves in each valve; and are immediately distinguished from the genus arca in not having teeth alternately locking in each other. A hundred and thirty-six species, thus divided into sections and sub-sections:

A. Valves furnished with ears and radiate; denominated scallop. These leap out of the water to the distance of half a yard, and, opening the shells, eject the water within them; after which they sink under the water, and suddenly close the shells with a loud snap.

This section is subdivided as follows:

α. Equilateral; ears of the valves equal: containing forty species, of which the following are the chief.

1. O. maxima. Shell with fourteen rounded and longitudinally striate rays; about five inches long and five and a half broad; ears large, with decussate striæ; hinge with a large deep hollow; lower valve convex, white, often varied with red bands or spots; upper valve flat, reddish. Found in most European seas, in large beds; whence they are dredged up and pickled, and barrelled for sale. This is the shell that was formerly worn by pilgrims on the hat or coat, as a mark that they had crossed the sea, for the purpose of paying their devotions at the Holy Land; in commemoration of which it is still preserved in the arms of many families.

2. O. rosea. Shell roundish, with five rays; middle-sized, rosy-coloured, the rays white; or green mixed with yellowish, lurid, and leek-green, with livid rays. Habitation uncertain.

β. Ears unequal, one of them generally ciliate with spines within; fifty-four species: the following are the chief.

3. O. pallium. Ducal mantle. Shell equivalve with twelve convex rays, striate, rough, and imbricate with scales. Inhabits India; the shell solid, red, varied with brown and white: margin denticulate.

4. O. opercularis. Shell with about twenty rays, roundish and rough, with decussate striæ; the upper valve a little more convex; both generally variegated with spots and other marks. Inhabits the northern seas; two and a half inches long and broad.

γ. Valves more gibbous on one side. Seven species.

B. Rough, and generally plated on the outside; comprising the tribe of oysters, properly so called. Twenty-six species.

5. O. edulis. Common oyster. Shell nearly orbicular and rugged, with undulate, imbricate scales; one valve flat and very entire. Inhabits European and Indian seas; found largely on our own coasts, and affixed to rocks or in copious beds; the fish well known as a palatable and nutritious food: shell of various sizes, forms, and colours, within white, and often glossy and irridescent like mother of pearl. The old shells have often an anomia fixed to them, and are frequently covered with serpulæ, lepades, sertulariæ, and other marine productions.

In the month of May the oysters cast their spawn (by the dredgers called spats), resembling the drop of a candle, and of the size of a halfpenny. The spat cleaves to stones, old oyster-shells, or pieces of wood, at the bottom of the sea. A calcareous secretion issues from it immediately, and in twenty-four hours this begins to be converted into a shell. In this month the dredgers (by the law of the Admiralty Court) have liberty to catch oysters of all kinds and sizes. When they have taken them, they gently raise the small brood from the cultch (or exotic matter to which they adhere) and then throw back the cultch, to preserve the ground for the future, unless they be so recently spatted, that they cannot be safely separated from the cultch; in which case they are permitted to take the stone or shell, &c. that the spat adheres to, each of which has often twenty spats. After the month of May it is a felony to carry away the cultch, and punishable to take any other oysters, unless such as are of the bigness of half-a-crown. The places in which oysters are chiefly catched are the Pont Burnham, Malden, and Colne waters near Chester. This brood and other oysters are carried to the creeks of the sea at Brickel Sea, Mersey, Langno, Fingrego, Wivenhoe, Tolesbury, and Saltcoase, and then thrown into channels which are called oyster-beds or layers, where they grow and fatten; and in two or three years the smallest brood will become oysters of full size.

If the oysters be to be green, they are put into pits about three feet deep, in salt marshes, which are overflowed only at spring tides; these possess sluices which let in the salt water till it is about a foot and a half deep. These pits from some quality of the soil co-operating with the heat of the sun will become green, and communicate their colour to the oysters that are put into them in four or five days; though they are commonly suffered to continue there six weeks or two months, by which time they become of a dark green. To prove that the sun operates in the greening, Tolesbury pits will green only in summer; but to prove also that the soil chiefly contributes, Brickel sea-pits green both summer and winter; and, as a farther proof, a pit within a foot of a greening pit will not green; and those that did green very well lose their quality in time.

When the tide flows, oysters lie with their hollow shell downwards, and when it ebbs they turn on the other side; they remove not from their place, unless in cold weather, to cover themselves with the ooze.

Oysters sicken after they have spatted; but in June and July they begin to recover, and in August are perfectly well. The male oyster is said to be black-sick, having a black substance in the fin: the female to be white-sick, having a milky substance in the fin. They are salt in the pits, salter in the layers, but saltest at sea.

6. O. diluviana. Shell plaited on the outside; the margin with erect acutangular teeth. Found in a fossil state in the calcareous mountains of Sweden, about the size of a common oyster; the margin with erect serratures formed as it were of the imbricate lamellæ of the shell, and transversely striate; valves with pectinate plates and acute wrinkles.

7. O. parasitica. Shell thin; lower valve convex and thicker, the other flat. Inhabits the Indian and Atlantic seas, and fixes itself to the roots and stumps of trees growing close to and hanging over the water, especially the mangifera; varies in form and size, but is often as large as the palm of the hand.

C. Hinge with a perpendicular grooved line Nine species: the following are examples:

8. O. perna. Shell equivalve, obovate, unequal, rounder at one end. Inhabits the Indian and American seas; about two and a half inches long, and in figure something resembling a ham or gammon of bacon; shell white, or dull ferruginous, lamellate, smooth at the hinge, with a short, straight, open beak.

9. O. isognomum. Shell equivalve, with a larger lobe nearly forming a right angle with the hinge. Inhabits the Indian ocean and South seas; from five to seven inches long, and about one and three-quarters broad in the middle; shell black with a violet mixture, and pearly within; lamellate with an open beak; very rare.

OSTREUM. (*ostreum*, οςρεον, from οςρακον, a shell). The oyster. The shell of this fish is occasionally used medicinally; its virtues are similar to those of the carbonate of lime. See Creta.

OSTRICH, in ornithology. See Struthio.

OSTRUTHIUM. (*ostruthium*. Blanchard calls it a corruption from *laserpitium*). See Imperatoria.

OSTUNI, a town of Naples, in Terra d'Otranto, with a bishop's see; seated on a mountain, near the gulf of Venice, 16 miles N.W. of Brindici, and 24 N.E. of Tarento. Lon. 17. 59 E. Lat. 40. 51 N.

OSWALD (St.), a village in Northumberland, on the Picts' wall, N. of Hexham, by some called Heaven-field, on account of Oswald's total defeat of Cedwall, a British usurper, who was killed on the first onset. Here Oswald, who was afterwards sainted, set up the first cross in the kingdom of Northumberland.

OSWEGO, a fort of North America, seated on the S. side of Lake Ontario, at the mouth of a river of the same name, 156 miles W.N.W. of Albany. Lon. 76. 15 W. Lat. 43. 15 N.

OSWEGO TEA, in botany. See MONARDA.

OSWIECZEN, a town of Poland, in the palatinate of Cracovia. It has a great trade in salt, and is seated on the Vistula, 15 miles S.W. of Cracow. Lon. 19. 44 E. Lat. 50. 0 N.

OSWESTRY, a corporate town in Shropshire, with a market on Wednesday. It had a wall and a castle, long ago demolished; and has some trade from Wales in flannels. It is 18 miles N. W. of Shrewsbury and 174 of London. Lon. 3. 3 W. Lat. 52. 52 N.

OSYRIS Poets cassia, or rosemary. In botany, a genus of the class diœcia, order triandria. Calyx three-cleft, coroiless. Male: filaments very short. Fem.: stigma roundish, three-parted; berry globular, one-celled, umbilicated. Two species; one O. alba with linear leaves; calyx and corol yellow; a native of the south of Europe: the other O. japonica with ovate, setaceous-serate floriferous leaves. The former is most frequently cultivated; and the mode of doing so is by sowing the berries in a dry stony soil: they will often remain two years before they vegetate.

OSYTH (St.), a village in Essex, nine miles S.E. of Colchester. Here are the remains of an ancient monastery, now the seat of the earl of Rochford.

OTACOUSTIC. (formed from ους ωλος, ear, and ακεω, I hear.) A term applied to instruments which aid or improve the sense of hearing. See ACOUSTIC.

OTAHA, one of the Society Islands, in the S. Pacific Ocean. It lies north of Ulitea; and is divided from it by a strait, which, in the narrowest part, is not more than two miles broad. This island is smaller and more barren than Ulitea, but has two very good harbours.

OTAHEITEE, an island in the South Pacific Ocean, lying in 18° S. lat. and 150° W. lon. and first discovered, in 1767, by captain Wallis, who called it George the Third's Island. Captain Cook came hither, in 1769, to observe the transit of Venus; sailed round the whole island in a boat, and staid three months: it was visited twice afterward by that celebrated navigator. It consists of two peninsulas, great part of which is covered with woods, consisting partly of bread-fruit trees, palms, cocoa-nut trees, plantains, bananas, mulberries, sugar-canes, and others peculiar to the climate, particularly a kind of pine apple and the dragon-tree. At the time of discovery the island had no European fruit, garden-stuff, pulse, or legumes, nor grain of any kind. Of tame animals, they have only hogs, dogs, and poultry; neither is there a wild animal in the island, except ducks, pigeons, parroquets, with a few other birds, and rats, there being no other quadruped, nor any serpent But the sea supplies them with great variety of most excellent fish to eat, which is their chief luxury, and to catch it their principal labour. The inhabitants have mild features, and a pleasing countenance. They are about the ordinary size of Europeans, of a pale mahogany brown, with fine black hair and eyes, and wear a piece of cloth round their middle, and another wrapped about the head like a turban. The women wear a piece of cloth, with a hole in the middle, through which they pass their heads, so that one part of the garment hangs down behind, and the other before, to the knees; a fine white cloth, like muslin, passes over this in various elegant turns round the body, a little below the breast, forming a kind of tunic, of which one turn sometimes falls gracefully across the shoulder. Both sexes are marked with black stains, occasioned by puncturing the skin, and rubbing a black colour into the wounds. As the climate is one of the hottest in the world, their houses have seldom any walls, but consist only of a roof, thatched with the long prickly leaves of the palm-nut tree, and supported by a few pillars made of the bread-fruit tree. Their cloth is made of the fibrous bark of the mulberry tree, which is beaten with a kind of mallet; and a glue, made of the hibiscus esculentus, is employed to make the bark cohere. Some of these pieces are two or three yards wide, and fifty yards long. Though the natives far excel most of the Americans in the knowledge and practice of the arts of ingenuity, yet they had not invented any method of boiling water. Long nails on the fingers are a mark of distinction among them, as among the Chinese; for they imply that such persons only as have no occasion to work could suffer them to grow to that length. The two sexes here eat separately, as in many other countries. Their provisions are chiefly fish, pork, cocoa-nuts, bread-fruit, and bananas; and they employ sea-water as a sauce both to fish and pork. Nothing can exceed their agility in swimming, diving, and climbing trees; and they are praised for their gentleness, good-nature, and hospitality. Omai, a native of this island, was brought over to England by captain Cook, and carried back by him, in his last voyage. In 1799, king Pomarre ceded the district of Malavai, on the N. side of this island, to some English missionaries. Point Venus is in lon. 149. 36 W. Lat. 17. 29 S.

OTALGIA. (*otalgia*, ωταλγια, from ους, the ear, and αλγος, pain.) The ear ache.

OTHER. *pron.* (oðeр, Saxon.) 1. Not the same; not this; different (*Swift*). 2. Not I, or he, but some one else (*Bacon*). 3. Not the one, not this, but the contrary (*South*). 4. Correlative to *each* (*Phil.*). 5. Something beside (*Locke*). 6. The next (*Shakspeare*). 7. The third past (*Ben Jonson*). 8. It is sometimes put elliptically for *other thing*; something different (*Glanville*).

OTHERA, in botany, a genus of the class

tetrandria, order monogynia. Petals four, lanceolate; calyx four-parted; stigma sessile; capsule doubtful. One species, a Japan shrub, flexuous with alternate branches; alternate leaves; flowers in alternate racemes.

OTHERGATES. *ad.* In another manner.

OTHERGUISE. *ad.* (*other* and *guise*.) Of another kind; sometimes written *other-guess*.

OTHERWHERE. *ad.* (*other* and *where*.) In other places (*Hooker*).

OTHERWHILE. *ad.* (*other* and *while*.) At other times.

OTHERWISE. *ad.* (*other* and *wise*.) 1. In a different manner (*Sprat*). 2. By other causes (*Raleigh*). 3. In other respects (*Rogers*).

OTHO (M. Salvius), a Roman emperor descended from the ancient kings of Etruria. He was one of Nero's favourites, and as such he was raised to the highest offices of the state. After Nero's death Otho conciliated the favour of Galba, the new emperor; but when Galba had refused to adopt him as his successor, he resolved to make himself absolute. The great debts which he had contracted encouraged his avarice, and he caused Galba to be assassinated, and made himself emperor. He was acknowledged by the senate and the Roman people, but the sudden revolt of Vitellius in Germany rendered his situation precarious. Otho obtained three victories over his enemies; but in a general engagement near Brixellum his forces were defeated, and he stabbed himself when all hopes of success were vanished, after a reign of about three months, on the 20th of April, A.D. 69.—2. Roscius, a tribune of the people, who in Cicero's consulship made a regulation to permit the Roman knights at public spectacles to have the fourteen first rows after the seats of the senators.

OTHO (Venius), a Dutch painter, born at Leyden in 1556, and became a disciple of Frederico Zucchero. He excelled in all parts of painting, and after residing at Rome several years, went to Germany, where he was received into the emperor's service. He died at Brussels in 1634. He had two brothers, Gilbert, an engraver, and Peter, a painter. Otho was the master of Rubens.

OTHO I. emperor of Germany, called the Great, was the eldest son of Henry the Fowler, and was crowned in 936, at the age of 14. Berenger having usurped the title of emperor in Italy, Otho entered Rome, where he was crowned by John XII. That pontiff afterwards leagued with Berenger, on which the emperor caused him to be deposed, and put Leo XIII. in his place in 963. He was no sooner returned to Germany than the Roman people revolted, and imprisoned Leo. Otho, therefore, made another expedition into Italy, and punished the senate of Rome severely. He afterwards made war on Nicephorus emperor of the east, with success. John Zimisces, successor of that monarch, made peace with Otho, who died in 373.

OTHO II. surnamed the Bloody, succeeded his father, Otho I. at the age of 18 years. His mother Adelaide opposed his accession, on which he expelled her from court. Her party proclaimed Henry duke of Bavaria emperor; but he was defeated by Otho, who also repulsed the Danes and Bohemians. He afterwards marched into Italy against the Saracens, by whom he was taken prisoner in 982, but ransomed for a large sum. He died at Verona the year following.

OTHO III. the son and successor of the preceding, was only three years old at the death of his father. On coming to age, he took the reins of government, and went to Italy, which was in a state of confusion, owing to the opposition of different popes. Otho having re-established order, returned into Germany, and created Boleslas king of Poland. He was obliged again to pass into Italy, to quell a revolt which had broken out. He died there in 1002, aged 22 years.

OTHO IV. called the Superb, was the son of Henry duke of Saxony, and chosen emperor in 1197. He was afterwards excommunicated by the pope for having seized the lands which the countess Matilda had left to the holy see. The princes of the empire elected Frederic king of Sicily in the room of Otho, who retired to Brunswick. He never recovered his throne, and died at Hauzberg in 1218. (*Watkins.*)

OTHONNA. African ragwort. In botany, a genus of the class syngenesia, order polygamia necessaria. Receptacle naked; seeds naked or downy; calyx one-leaved, many-cleft, somewhat cylindrical. Thirty-five species; natives of Africa, mostly of the Cape: some with leaves cut or pinnate; others with leaves undivided, toothed, or very entire.

The cultivated species are,

1. O. bulbosa. Bulbous African ragwort.
2. O. pectinata. Wormwood-leaved ragwort.
3. O. abrotanifolia. Southern-leaved ragwort.
4. O. coronopifolia. Buckthorn-leaved ragwort.
5. O. cheirifolia. Stock-leaved ragwort.
6. O. arborescens. Tree ragwort.

They produce an agreeable variety among other potted plants of the green-house kind.

OTHRYADES, one of the 300 Spartans who fought against 300 Argives, when those two nations disputed their respective right to Thyrea. Two Argives, Alcinor and Cronius, and Othryades, survived the battle. The Argives went home to carry the news of their victory, but Othryades, who had been reckoned among the number of the slain, recovered himself, and carried some of the spoils of which he had stripped the Argives into the camp of his countrymen; and after he had raised a trophy, and had written with his own blood the word *vici* on his shield, he killed himself, unwilling to survive the death of his countrymen.

OTIPYOSIS. (from ους, the ear, and πυον, pus). An inflammation of the ear.

OTIS. Bustard. In zoology, a genus of the class aves, order gallinæ. Bill subconvex;

nostrils oval, pervious: tongue bifid, pointed; feet formed for running, three-toed, tall, naked above the thighs. Eleven species, natives of Europe, Asia, or Africa. The following are the chief:

1. O. tarda. Great bustard. Wave-spotted with black and rufous, beneath whitish; head (of the male) and throat on each side crested; head and neck cinereous; quill-feathers black; tail with rufous and black lines, the feathers eighteen or twenty; pouch beginning under the tongue and reaching to the breast, long, capacious, able to hold near seven quarts of water, probably for the purpose of supplying the hen whilst she sits, or the young before they can fly: legs dusky. Found frequently in Great Britain; inhabits also the open plains of Europe, Asia, and Africa; feeds on grains and herbs; four feet long; weighs often twenty-five pounds; is solitary and shy, except about the time of migration; flies heavily, but runs swiftly; is quick of sight and hearing; lays two pale olive-brown eggs, with darker spots, in a hole scraped in the ground. Towards autumn, when the young are grown up, bustards collect together in flocks of forty or fifty, and commit depredations upon the turnip fields. Although collected in these numerous bodies, and of great strength, they are so extremely timid, that, on the smallest appearance of danger, they all consult their safety by flight. When raised, and fairly on wing, they can fly for several miles without resting; but, as they find it extremely difficult to take their flight, especially when hurried by the dogs, they endeavour to save themselves by running, in which they are very alert. From their want of the back toe, they are incapable of perching upon trees; and, therefore, fall a sacrifice, at last, to their pursuers. When taken, so great is their terror, that they die rather from fear than from the wounds they have received.

2. O. oedicnemus. Thick-kneed bustard. Grey; two first quill-feathers black, white in the middle; bill sharp-pointed; legs cinereous. Inhabits Europe, Asia and Africa; feeds in the night on caterpillars, worms, and other reptiles; breeds in holes or among stones on the bare ground; eggs copper-colour spotted with darker red; makes a piercing shrill cry, and migrates.

OTITIS. (*otitis*, ὠτῖτις, from οὖς, the ear.) Inflammation of the internal ear. It is known by pyrexy, and an excruciating and throbbing pain in the internal ear, that is sometimes attended with delirium.

OTLEY, a town in W. Yorkshire, with a market on Friday, seated on the Wharf, under a high craggy cliff, 25 miles W. of York, and 203 N.N.W. of London.

OTRANTO, or TERRA D'OTRANTO, a province of Naples, 70 miles long and 30 broad; bounded on the N. by Terra di Bari, and all other parts by the sea. It is a mountainous country, abounding in olives, figs, and wine. Here is a kind of spider, called Tarantula, whose bite is venomous: and the country is often visited by locusts. See LECCE.

OTRANTO, a strong city and seaport of Naples, capital of Terra d'Otranto, and an archbishop's see, with a commodious harbour, and a citadel. It has a considerable trade, and is seated on the gulf of Venice, 140 miles S.E. of Bari. Lon. 18. 35 E. Lat. 40. 20 N.

OTTER. In mastiology. See MUSTELA.

OTTER-HUNTING. A sport at present but little pursued, yet formerly in great vogue. Hounds were then kept and trained for the purpose, and the mode of hunting is thus described by Mr. Daniell: "The sportsmen went on each side the river, beating the banks and sedges with the dogs; if there was an otter in that quarter, his seal was soon traced upon the mud, as the water, wherever it would admit of it, was lowered as much as possible, to expose the hollow banks, reed beds and stubs that might otherwise shelter him: each hunter had a spear to attack the otter when he vented, or came to the surface of the water to breathe. If an otter was not soon found by the river-side, it was imagined he was gone to couch more inland, and was sought for accordingly; (for sometimes they will feed a considerable distance from their place of rest, choosing rather to go up than down the stream.) If the hounds found an otter, the sportsman viewed his track in the mud, to find which way he had taken. The spears were used in aid of the dogs. When an otter is wounded, he makes directly to land, where he maintains an obstinate defence: he bites severely, and does not readily quit his hold: when he seizes the dogs in the water, he always dives with, and carries them far below the surface: an old one will never give up while he has life; and it is observable, that the male otter never makes any complaint when seized by the dogs, or transfixed with a spear; but the pregnant females emit a very shrill squeal." This sport, as it is called, is still continued in several remote, fenny, and watery districts; but in general is principally confined to parts where, from local circumstances, the other more exhilarating pleasures of the chase cannot be enjoyed.

OTTER OF ROSES. See ROSES.

OTTERBURN, a village in Northumberland, on the river Reed, 22 miles W. by N. of Morpeth. It is noted for a battle, in 1388, between the English under the earl of Northumberland and his two sons, and the Scots under sir William Douglas, who was slain by Henry Percy, surnamed Hotspur; but the Scots obtained the victory, and the two Percies were made prisoners. On this battle the ballad of Chevy Chase is founded.

OTTERSBERG, a town of Westphalia, in the duchy of Bremen, with a fort, 17 miles N.E. of Bremen.

OTTERY ST. MARY, a town in Devonshire, with a market on Tuesday. It has a large church with two square towers, and manufactures of flannels, serges, &c. It is seated on the rivulet Otter, 10 miles E. of Exeter, and 161 W. by S. of London.

OTWAY (Thomas), an eminent tragic poet, was the son of Humphry Otway, rector

of Wolbeding, in Sussex; and was born at Trottin in that county, on the 3d of March, 1651. He was educated at Oxford; when, leaving the university without a degree, he retired to London, where he commenced player, but with indifferent success. However, the sprightliness of his conversation gained him the favour of Charles Fitz-Charles earl of Plymouth, who procured him a cornet's commission in one of the new-raised regiments sent into Flanders; but he returned from thence in very necessitous circumstances, and applied himself again to writing for the stage. In comedy he has been deemed too licentious; which, however, was no great objection to his pieces in the profligate days of Charles II. But, in tragedy, few English poets have ever equalled him; and perhaps none ever excelled him in touching the passions, particularly the tender passion. There is generally something familiar and domestic in the fable of his tragedies, and there is amazing energy in his expression. The heart that does not melt at the distresses of his Orphan must be hard indeed! But though Otway possessed in so eminent a degree the rare talent of writing to the heart, yet he was not very favourably regarded by some of his contemporary poets, nor was he always successful in his dramatic compositions. After experiencing many reverses of fortune in regard to his circumstances, but generally changing for the worse, he at last died wretchedly in a public-house on Tower-hill; whither, it is supposed, he had retired, in order to avoid the pressure of his creditors. Some have said, that downright hunger compelling him to fall too eagerly on a piece of bread, of which he had been for some time in want, the first mouthful choaked him, and instantly put a period to his days. Dr. Johnson gives this account of the matter: "He died in a manner which I am unwilling to mention. Having been compelled by his necessities to contract debts, and hunted, as is supposed, by the terriers of the law, he retired to a public-house on Tower-hill, where he died of want; or, as it is related by one of his biographers, by swallowing, after a long fast, a piece of bread which charity had supplied. He went out, as is reported, almost naked, in the rage of hunger, and finding a gentleman in a neighbouring coffee-house, asked him for a shilling. The gentleman gave him a guinea; and Otway going away bought a roll, and was choaked with the first mouthful. All this, I hope, is not true; but that indigence, and its concomitants sorrow and despondency, brought him to the grave, has never been denied."

Johnson speaks of him in nearly these terms: Otway had not much cultivated versification, nor had he much replenished his mind with general knowledge. His principal power was in moving the passions, to which Dryden in his latter years left an illustrious testimony. He appears, by some of his verses, to have been a zealous royalist; and had what was in those times the common reward of loyalty; he lived and died neglected. His dramatic writings are nine in number; the most admired of which are, The Orphan and Venice Preserved. He had also made some translations, and wrote several miscellaneous poems. His whole works are printed in two pocket-volumes. He wrote four acts of a play which are lost.

OVAL, an oblong curvilinear figure, having two unequal diameters, and bounded by a curve line returning into itself. Or a figure contained by a single curve line, imperfectly round, its length being greater than its breadth, like an egg: whence its name.

The proper oval, or egg-shape, is an irregular figure, being narrower at one end than the other; in which it differs from the ellipse, which is the mathematical oval, and is equally broad at both ends.—The common people confound the two together: but geometricians call the oval a false ellipse.

Oval denotes also certain roundish figures, of various and pleasant shapes, among curve lines of the higher kinds. These figures are expressed by equations of all dimensions above the 2d, and more especially the even dimensions, as the 4th, 6th, &c. Of this kind is the equation $a^2y^2 = -x^4 + a^3$, which denotes an oval in shape of the section of a pear from the stalk down the middle. The equations for various other ovals, with their figures, may be seen in Hutton's Dictionary, vol. ii. p. 183.

O'VAL. *a.* (*ovale*, Fr. *ovum*, Lat. an egg.) Oblong; resembling the longitudinal section of an egg (*Blackmore*).

OVAL LEAF, in botany. Cujus diameter longitudinalis superat transversalem, superiore et inferiore extremitate angustiore. Philos. Bot.—Ex orbiculato oblongum, utraque extremitate rotundata æquali. Delin. Pl.—Having the longitudinal diameter longer than the transverse one, and the curvature the same at both ends. In Philos. Botan. the elliptic leaf is made synonymous with this; but in Delin. Pl. they are distinguished. In truth, an oval leaf has nearly the same proportion with the section of a hen's egg; although it has not the difference of curvature at the two extremities which that and the ovate leaf have. Whereas an elliptic leaf, as botanists understand it, is much longer in proportion to its breadth, or more eccentric than the oval.

OVA'RIOUS. *a.* (from *ovum*, Lat.) Consisting of eggs (*Thomson*).

OVARIUM. (*ovum*, an egg.) The ovaria are two flat oval bodies, about one inch in length, and rather more than half in breadth and thickness, suspended in the broad ligaments, at about the distance of one inch from the uterus behind, and a little below the Fallopian tubes. To the ovaria, according to the idea of their structure entertained by different anatomists, various uses have been assigned, or the purpose they answer has been differently explained. Some have supposed that their texture was glandular, and that they secreted a fluid equivalent to, and similar to the male semen; but others, who have examined them with more care, assert that they are ovaria in the literal acceptation of the term, and include

a number of vesicles, or ova, to the amount of twenty-two of different sizes, joined to the internal surface of the ovaria by cellular threads or pedicles; and that they contain a fluid which has the appearance of thin lymph. These vesicles are, in fact, to be seen in the healthy ovaria of every young woman. They differ very much in their number in different ovaria, but are very seldom so numerous as has just been stated. All have agreed that the ovaria prepare whatever the female supplies towards the formation of the fetus; and this is proved by the operation of spaying, which consists in the extirpation of the ovaria, after which the animal not only loses the power of conceiving, but desire is for ever extinguished. The outer coat of the ovaria, together with that of the uterus, is given by the peritonæum; and whenever an ovum is passed into the Fallopian tube, a fissure is observed at the part through which it is supposed to have been transferred. These fissures healing, leave small longitudinal cicatrices on the surface, which are said to enable us to determine, whenever the ovarium is examined, the number of times a woman has conceived. The corpora lutea are oblong glandular bodies of a yellowish colour, found in the ovaria of all animals when pregnant, and, according to some, when they are salacious. They are said to be calyces, from which the impregnated ovum has dropped; and their number is always in proportion to the number of conceptions found in the uterus. They are largest and most conspicuous in the early state of pregnancy, and remain for some time after delivery, when they gradually fade and wither till they disappear. The corpora lutea are extremely vascular, except at their centre, which is whitish; and in the middle of the white part is a small cavity, from which the impregnated ovum is thought to have immediately proceeded. The ovaria are the seat of a particular kind of dropsy, which most commonly happens to women at the time of the final cessation of the menses, though not unfrequently at a more early period of life. It is of the encysted kind, the fluid being sometimes limpid and thin, and at others discoloured and gelatinous. In some cases it has been found to be contained in one cyst, often in several, and in others the whole tumefaction has been composed of hydatids not larger than grapes. The ovaria are also subject, especially a short time after delivery, to inflammation, terminating in suppuration, and to scirrhous and cancerous diseases, with considerable enlargement. In the former state, they generally adhere to some adjoining part, as the uterus, rectum, the bladder, or the external integuments, and the matter is discharged from the vagina by stool, by urine, or by an external abscess of the integuments of the abdomen.

OVATE LEAF. An egg-shaped leaf.—Cujus diameter longitudinalis superat transversalem, basi segmento circuli circumscripta, apice vero eodem angustiore. The longitudinal diameter exceeding the transverse one; the base a segment of a circle, but narrower (or having a greater degree of curvature) at top. The shape of this leaf is that of the longitudinal section of an egg. The term egged sounds unpleasant to the ear. It is frequently confounded, by careless writers, with the OVAL LEAF, which see.

OVATE-LANCEOLATE LEAF. Between these two forms, but inclining to the latter.

OVATE-OBLONG LEAF, OR SEED. Ovate lengthened out.

OVATE-SUBULATE CAPSULE. Between ovate and awl-shaped, but most tending to the latter. As in aconitum.

OVATION. *s.* (*ovatio*, Latin.) A lesser triumph among the Romans.

OUDE, a province of Hindustan Proper, subject to a nabob, whose dominions lie on both sides of the Ganges, occupying (with the exception of the district of Rampour) all the flat country between that river and the northern mountains, as well as the principal part of that fertile tract, lying between the Ganges and Jumna, known by the name of Dooab, to within 40 miles of the city of Delhi. Oude and its dependencies are estimated at 360 miles in length from E. to W. and in breadth from 150 to 180. The nabob is in alliance with the British; and a brigade of the Bengal army is constantly stationed on his western frontier; which answers the purpose of covering Oude as well as Bengal, and of keeping the western states in awe; and, in consideration of this, the nabob pays an annual subsidy of 420,000l. His capital is Lucknow.

OUDE, an ancient city of Hindustan Proper, in the province of Oude, the remains of which are seated on the Gogra, nearly adjoining Fyzabad. It is said to have been the first imperial city of Hindustan, and the capital of a great kingdom, 1200 years before the Christian era. It is frequently mentioned in the Mahaberet, a famous Hindu work in Sanscrit, under the name of Adjudiah. But whatever may have been its former magnificence, no traces of it are left. It is considered as a place of sanctity; and the Hindus frequently come hither, in pilgrimage, from all parts of India.

OUDENARD, a strong town of Austrian Flanders, in the middle of which is a fort. Here is a manufacture of very fine linen and of curious tapestry. This town was besieged by the French in 1708, but they were obliged to raise the siege by the duke of Marlborough, who entirely routed their army. It is seated on both sides the Scheld, 12 miles S. of Ghent, and 27 W. of Brussels. Lon. 3. 49 E. Lat. 50. 51 N.

OUDENBURGH, a town of Austrian Flanders, eight miles S.E. of Ostend, and 10 W. of Bruges. Lon. 3. 0 E. Lat. 51. 9 N.

OUDIN (Casimir), a French monk of Mezieres. He became a recluse in the abbey of Boucilly, in Champagne, where Lewis XIV. accidentally saw him, and employed his abilities. In 1690 he turned protestant, and was made under librarian at Leyden, where he died 1717. He wrote Commentarius de scriptoribus ecclesiæ antiquis et eorum scriptis;

3 vols. folio—veterum aliquot Galliæ et Belgiæ scriptorum opuscula sacra, &c. 8vo, &c.

Oudin (Francis), of Vignori, in Champagne, was professor of humanity and theology, and settled at Dijon, where he died of a dropsy in the chest, 1752, aged 79. He was well versed in the ecclesiastical history of the fathers. He published Somnia, an elegant Latin poem, odes, elegies, &c. printed in his Poemata Didascalia, 3 vols. 12mo.—Bibliotheca Scriptorum Societatis Jesu, &c.

OUDINET (Mark Anthony), a French medalist at Rheims, 1643. He quitted his professorship of law to go to Paris. The order which he introduced in the king's collection obtained a pension from the king, and a seat in the academy of belles lettres. He died at Paris, 1712. He wrote three dissertations, of great merit, on medals.

OVEN, a kind of domestic furnace, used for baking bread, pies, tarts, &c. Ovens are generally constructed of brick-work in an oval form with a very low roof, the bottom being laid with bricks or flat stones. In the front is a small aperture and door, by the shutting of which the heat is confined while the bread is baking. Such ovens are usually heated by means of dry faggots, wood, &c. As these ovens, however, are not calculated for small families, on account of the great space they require, and the quantity of fuel they consume, others have been contrived on a more diminutive scale: these are usually formed of cast or hammered iron, and may be heated by the same fire which serves for the cooking of other provisions.

Among the ovens of this construction, that of Mr. Powers, who obtained for it a patent in 1801, deserves to be noticed. It is formed of iron, so as to be portable, and may be conveniently conveyed to any distance, at the option of its possessor; but, as the reader cannot form a distinct idea of this contrivance, without the aid of an engraving, we refer him to the 14th vol. of the Repertory of Arts, &c. where the patent is described, and illustrated with a plate.

In the year 1800, the Society for the Encouragement of Arts, &c. conferred a bounty of 15 guineas on Mr. S. Holmes, for his invention of an oven, which is heated without flues. The whole consists of a cast-iron oven, from the side of which a solid piece of that metal projects into the fire, where it constantly remains; and, on becoming red hot, communicates to the whole oven a degree of heat sufficient for baking bread, while it at the same time assists the fire in roasting meat.

In the common iron ovens, the heat is communicated by means of flues, which waste a considerable part of the fire in its passage, and likewise require much labour to keep them of an uniform heat. The contrivance last alluded to is intended to supply this and other inconveniences: and Mr. Holmes states, that his oven uniformly remains at a baking heat, without any additional expence, or trouble. We understand, however, that such improvement is by no means new; and that a similar method of saving fuel has for several years been practised in the West of England

O'VER has a double signification in the names of places. If the place be upon or near a river, it comes from the Saxon oꝼre, a brink or bank: but if there is in the neighbourhood another of the same name, distinguished by the addition of nether, then *over* is from the Gothic *ufar*, above (*Gibson's Camden*).

O'ver. *prep.* (*ufar*, Gothic; oꝼre, Sax.) 1. Above, with respect to excellence or dignity (*Swift*). 2. Above, with regard to rule or authority. 3. Above in place (*Shakspeare*). 4. Across; from side to side (*Dryden*). 5. Through; diffusively (*Hammond*). 6. Upon (*Bacon*). 7. Before: as, over *night* (*Spens*).

O'ver. *ad.* 1. Above the top (*Luke*). 2. More than a quantity assigned: *five feet and an inch* over (*Hayward*). 3. From side to side: *the river was a mile* over (*Grew*). 4. From one to another (*Bacon*). 5. From a country beyond the sea: *the king went* over *to France*. 6. On the surface. *the ground is all* over *green* (*Genesis*). 7. Past: *when his rage was* over, *he repented* (*Knolles*). 8. Throughout; completely: *I have thought the design* over (*South*). 9. With repetition; another time: over *again*; over *and* over (*Dryden*). 10. Extraordinary; in a great degree: *be not* over-*hasty in judging* (*Baker*). 11. Over *and above*. Beside; beyond what was first supposed, or immediately intended. 12. Over *against*. Opposite; regarding in front (*Bac.*). 13. *To give over*. To cease from (*Pope*). 14. In composition it has a great variety of significations; it is arbitrarily prefixed to nouns, adjectives, or other parts of speech, in a sense equivalent to more than enough.

To O'VERABOUND. *v. n.* (*over* and *abound.*) To abound more than enough (*Philips*).

To O'VERACT. *v. a.* (*over* and *act.*) To act more than enough (*Stillingfleet*).

OVERALL (John), an English prelate, born 1559. He was of St. John's college, Cambridge, and removed to Trinity. In 1696 he was made regius professor of divinity, D.D. and master of Catharine hall, and in 1601 became dean of St Paul. In 1614 he was made bishop of Lichfield and Coventry, and in 1618 translated to Norwich, where he died 1619. He was a learned divine, and wrote a convocation book, and other works.

To OVERA'RCH. *v. a.* (*over* and *arch.*) To cover as with an arch (*Pope*).

To OVERA'WE. *v. a.* (*over* and *awe.*) To keep in awe by superiour influence (*Spen.*).

To OVERBA'LANCE. *v. a.* To weigh down; to preponderate (*Rogers*).

Overba'lance. *s.* (*over* and *balance.*) Something more than equivalent (*Locke*).

OVERBA'TTLE. *a.* Too fruitful; exuberant (*Hooker*).

To OVERBE'AR. *v. a.* To repress; to subdue; to whelm; to bear down (*Hooker*).

To OVERBI'D. *v. a.* (*over* and *bid.*) To offer more than equivalent (*Dryden*).

To OVERBLO'W. *v. n.* (*over* and *blow.*) To be past its violence (*Dryden*).

To OVERBLO'W. *v. a.* To drive away as clouds before the wind (*Waller*).

O'VERBOARD. *ad.* (*over* and *board.* See BOARD.) Off the ship; out of the ship (*Dryden*).

To OVERBU'LK. *v. a.* (*over* and *bulk.*) To oppress by bulk (*Shakspeare*).

To OVERBU'RDEN. *v. a.* (*over* and *burden.*) To load with too great weight (*Sidney*).

OVERBURY (Sir Thomas), an English writer, born in 1581, at Compton-Scorfen, Warwickshire. He was of Queen's college, Oxford, and entered at the Middle Temple; but relinquished the law for literature, and for the court. He became the friend of Car, earl of Somerset, but he stained his character in promoting the amours of that profligate nobleman with the licentious countess of Essex; and as if ashamed of his conduct, he boldly attempted to dissuade him from marrying so worthless a woman. Car revealed the friendly advice, and the countess meditated revenge. By the means of Car, Overbury was appointed ambassador to Russia, and then insidiously encouraged to refuse the office, in consequence of which the king sent him to the Tower as a disloyal man. In this place poison was administered to him, and he fell a sacrifice to the diabolical intrigues of his perfidious friend and his guilty mistress, 1613. The murder was hushed by the power of the offender; but two years after it was fully disclosed: the under-agents were tried, condemned, and executed; but the earl and the countess, after being found guilty, were pardoned by the king. Sir Thomas, who has been compared in his learning and his melancholy fate to Germanicus Cæsar, was the author of some works in prose and verse, of considerable merit.

To OVERBU'Y. *v. a.* (*over* and *buy.*) To buy too dear (*Dryden*).

To OVERCA'RRY. *v. a.* (*over* and *carry.*) To hurry too far; to be urged to any thing violent or dangerous (*Hayward*).

To OVERCA'ST. *v. a.* (*over* and *cast.*) 1. To cloud; to darken; to cover with gloom (*Spenser*). 2. To cover (*Hooker*). 3. To rate too high in computation (*Bacon*).

To OVERCHA'RGE. *v. a.* (*over* and *charge.*) 1. To oppress; to cloy; to surcharge (*Raleigh*). 2. To load; to crowd too much (*Pope*). 3. To burden (*Shakspeare*). 4. To rate too high (*Shakspeare*). 5. To fill too full (*Addison*). 6. To load with too great a charge (*Shakspeare*).

To OVERCLO'UD. *v. a.* (*over* and *cloud.*) To cover with clouds (*Tickel*).

To OVERCO'ME. *v. a.* pret. I *overcame*; part. pass. *overcome*; anciently *overcomen*, as in *Spenser*. (*overcomen*, Dutch.) 1. To subdue; to conquer; to vanquish (*Spenser*). 2. To surmount (*Law*). 3. To overflow; to surcharge (*Philips*). 4. To come over or upon; to invade suddenly: not in use (*Shakspeare*).

To OVERCO'ME. *v. n.* To gain the superiority (*Romans*).

OVERCO'MER. *s.* (from the verb.) He who overcomes.

To OVERCO'UNT. *v. a.* (*over* and *count.*) To rate above the true value (*Shakspeare*).

To OVERDO'. *v. a.* (*over* and *do.*) To do more than enough (*Grew*).

To OVERDRESS. *v. a.* (*over* and *dress.*) To adorn lavishly (*Pope*).

To OVERDRI'VE. *v. a.* (*over* and *drive.*) To drive too hard, or beyond strength (*Genesis*).

To OVERE'YE. *v. a.* (*over* and *eye.*) 1. To superintend. 2. To observe; to remark (*Shakspeare*).

To OVERE'MPTY. *v. a.* (*over* and *empty.*) To make too empty (*Carew*).

O'VERFAL. *s.* (*over* and *fall.*) Cataract (*Raleigh*).

OVERFLACKEE, an island of the United Provinces, in Holland, between the mouths of the Maese. Melsand is the principal town.

To OVERFLO'AT. *v. n.* (*over* and *float.*) To swim; to float (*Dryden*).

To OVERFLO'W. *v. n.* (*over* and *flow.*) 1. To be fuller than the brim can hold (*Dryden*). 2. To exuberate; to abound (*Rogers*).

To OVERFLO'W. *v. a.* 1. To fill beyond the brim (*Taylor*). 2. To deluge; to drown; to overrun (*Dryden*).

O'VERFLOW. *s.* (*over* and *flow.*) Inundation; more than fulness; such a quantity as runs over; exuberance (*Arbuthnot*).

O'VERFLOWING. *s.* (from *overflow.*) Exuberance; copiousness (*Rogers*).

OVERFLO'WINGLY. *ad.* Exuberantly; in great abundance (*Boyle*).

To OVERFLY'. *v. a.* (*over* and *fly.*) To cross by flight (*Dryden*).

OVERFO'RWARDNESS. *s.* (*over* and *forwardness.*) Too great quickness; too great readiness (*Hale*).

To OVERFREIGHT. *v. a.* (*over* and *freight.*) To load too heavily; to fill with too great quantity (*Carew*).

To OVERGE'T. *v. a.* (*over* and *get.*) To reach; to come up with (*Sidney*).

To OVERGLA'NCE. *v. a.* (*over* and *glance.*) To look hastily over (*Shakspeare*).

To OVERGO'. *v. a.* (*over* and *go.*) To surpass; to excel (*Sidney*).

To OVERGO'RGE. *v. a.* (*over* and *gorge.*) To gorge too much (*Shakspeare*).

To OVERGRO'W. *v. a.* (*over* and *grow.*) 1. To cover with growth (*Spenser*). 2. To rise above (*Mortimer*).

To OVERGRO'W. *v. n.* To grow beyond the fit or natural size (*Knolles*).

O'VERGROWTH. *s.* (*over* and *growth.*) Exuberant growth (*Bacon*).

To OVERHA'LE. *v. a.* (*over* and *hale.*) 1. To spread over (*Spenser*). 2. To examine over again.

To OVERHA'NG. *v. a.* (*over* and *hang.*) To jut over; to impend over (*Shakspeare*).

To OVERHA'RDEN. *v. a.* (*over* and *harden.*) To make too hard (*Boyle*).

OVERHAULING, the act of opening and extending the several parts of a tackle, or other assemblage of ropes, communicating with

blocks or dead eyes. It is used to remove those blocks to a sufficient distance from each other, that they may be again placed in a state of action, so as to produce the effect required.

OVERHAULING is also vulgarly expressive of an examination or inspection into the condition of a person or thing.

O'VERHEAD. *ad.* (*over* and *head.*) Aloft; in the zenith; above (*Milton*).

To OVERHE'AR. *v. a.* (*over* and *hear.*) To hear those who do not mean to be heard (*Shakspeare*).

To OVERHE'ND. *v. a.* (*over* and *hend.*) To overtake; to reach (*Spenser*).

To OVERJO'Y. *v. a.* (*over* and *joy.*) To transport; to ravish (*Taylor*).

OVERJO'Y. *s.* Transport; ecstacy (*Shaksp.*).

To OVERLA'BOUR. *v. a.* (*over* and *labour.*) To bestow too much pains on any thing; to harass with toil (*Dryden*).

To OVERLA'DE. *v. a.* (*over* and *lade.*) To overburden (*Suckling*).

O'VERLARGE. *a.* (*over* and *large.*) Larger than enough (*Collier*).

OVERLA'SHINGLY. *ad.* (*over* and *lash.*) With exaggeration: obsolete (*Brerewood*).

To OVERLA'Y. *v. a.* (*over* and *lay.*) 1. To oppress by too much weight or power. 2. To smother with too much or too close covering (*Milton*). 3. To smother; to crush; to overwhelm (*Addison*). 4. To cloud; to overcast (*Spenser*). 5. To cover superficially (*Exodus*). 6. To join by something laid over (*Milton*).

To OVERLE'AP. *v. a.* (*over* and *leap.*) To pass by a jump (*Dryden*).

O'VERLEATHER. *s.* (*over* and *leather.*) The part of the shoe that covers the foot (*Shakspeare*).

To OVERLI'VE. *v. a.* (*over* and *live.*) To live longer than another; to survive; to outlive (*Hayward*).

To OVERLI'VE. *v. n.* To live too long (*Milton*).

O'VERLIVER. *s.* (from *overlive.*) Surviver; that which lives longest (*Bacon*).

To OVERLO'AD. *v. a.* (*over* and *load.*) To burden with too much (*Felton*).

O'VERLONG. *a.* (*over* and *long.*) Too long (*Boyle*).

To OVERLO'OK. *v. a.* (*over* and *look.*) 1. To view from a higher place (*Dryden*). 2. To view fully; to peruse (*Shakspeare*). 3. To superintend; to oversee (*Graunt*). 4. To review (*Roscommon*). 5. To pass by indulgently (*Rogers*). 6. To neglect; to slight (*Att.*).

O'VERLOOKER. *s.* (*over* and *looker.*) One who looks over his fellows (*Watts*).

O'VERLOOP. *s.* The same with *orlop* (*Raleigh*).

O'VERMASTED. *a.* (*over* and *mast.*) Having too much mast (*Dryden*).

To OVERMA'STER. *v. a.* (*over* and *master.*) To subdue; to govern (*Shakspeare*).

To OVERMA'TCH. *v. a.* (*over* and *match.*) To be too powerful; to conquer (*Dryden*).

OVERMA'TCH. *s.* One of superiour powers; one not to be overcome (*Milton*).

OVERME'ASURE. *s.* (*over* and *measure.*) Something given over the due measure.

To OVERMI'X. *v. a.* (*over* and *mix.*) To mix with too much (*Creech*).

O'VERMOST. *a.* (*over* and *most.*) Highest; over the rest in authority (*Ainsworth*).

OVERMU'CH. *a.* (*over* and *much.*) Too much; more than enough (*Locke*).

OVERMU'CH. *ad.* In too great a degree.

To OVERNA'ME. *v. a.* (*over* and *name.*) To name in a series (*Shakspeare*).

O'VERNIGHT. *s.* (*over* and *night.*) Night before bedtime (*Shakspeare*).

To OVERO'FFICE. *v. a.* (*over* and *office.*) To lord by virtue of an office (*Shakspeare*).

OVEROFFI'CIOUS. *a.* (*over* and *officious.*) Too busy; too importunate (*Collier*).

To OVERPA'SS. *v. a.* (*over* and *pass.*) 1. To cross (*Dryden*). 2. To overlook; to pass with disregard (*Milton*). 3. To omit in a reckoning (*Raleigh*). 4. To omit; not to receive (*Hooker*).

To OVERPA'Y. *v. a.* (*over* and *pay.*) To reward beyond the price (*Prior*).

To OVERPE'RCH. *v. a.* (*over* and *perch.*) To fly over (*Shakspeare*).

To OVERPE'ER. *v. a.* (*over* and *peer.*) To overlook; to hover above: not used (*San.*).

O'VERPLUS. *s.* (*over* and *plus.*) Surplus; what remains more than sufficient (*Hooker*).

To OVERPLY'. *v. a.* (*over* and *ply.*) To employ too laboriously (*Milton*).

To OVERPO'ISE. *v. a.* (*over* and *poise.*) To outweigh (*Brown*).

OVERPO'ISE. *s.* (from the verb.) Preponderant weight (*Dryden*).

To OVERPO'WER. *v. a.* (*over* and *power.*) To be predominant over; to oppress by superiority (*Woodward*).

To OVERPRE'SS. *v. a.* (*over* and *press.*) To bear upon with irresistible force; to overwhelm; to crush (*Roscommon.*)

To OVERPRI'ZE. *v. a.* (*over* and *prize.*) To value at too high price (*Wotton*).

OVER-RAKE, among seamen: when a ship riding at anchor so overbeats herself into an high sea, that she is washed by the waves breaking in upon her, they say the waves overrake her.

OVERRA'NK. *a.* (*over* and *rank.*) Too rank (*Mortimer*).

To OVERRA'TE. *v. a.* (*over* and *rate.*) To rate at too much (*Rogers*).

To OVERRE'ACH. *v. a.* (*over* and *reach.*) 1. To rise above (*Raleigh*). 2. To deceive; to go beyond (*Tillotson*).

To OVERRE'ACH. *v. n.* A horse is said to *overreach* when he brings his hinder feet too far forward, and strikes his toes against his fore shoes (*Farrier's Dict.*).

O'VERREACHER. *s.* (from *overreach.*) A cheat; a deceiver.

To OVERRE'AD. *v. a.* (*over* and *read.*) To peruse (*Shakspeare*).

To OVERRI'PEN. *v. a.* (*over* and *ripen.*) To make too ripe (*Shakspeare*).

To OVERRO'AST. *v. a.* (*over* and *roast.*) To roast too much (*Shakspeare*).

To OVERRU'LE. *v. a.* (*over* and *rule.*) 1. To influence with predominant power; to be superiour in authority (*Sidney*). 2. To govern with high authority; to superintend (*Hayward*). 3. To supersede (*Carew*).

To OVERRU'N. *v. a.* (*over* and *run.*) 1. To harass by incursions; to ravage (*Addison*). 2. To outrun; to pass behind (*Bacon*). 3. To overspread; to cover all over (*Burnet*). 4. To do mischief by great numbers; to pester (*Add.*). 5. To injure by treading down.

To OVERRU'N. *v. n.* To overflow; to be more than full (*Spenser*).

To OVERSEE'. *v. a.* (*over* and *see.*) 1. To superintend; to overlook (*Spenser*). 2. To overlook; to pass by unheeded; to omit (*Hudibras*).

OVERSE'EN. *part.* (from *oversee.*) Mistaken; deceived (*Clarendon*).

O'VERSEER. *s.* (from *oversee.*) 1. One who overlooks; a superintendant. 2. An officer who has the care of the parochial provision for the poor (*Graunt*).

OVERSEERS OF THE POOR. By 43 Elizabeth, c. 2, s. 1, the churchwardens of every parish, or two substantial householders, to be nominated yearly in Easter week, or within one month after Easter, under the hand and seal of two justices of the peace of the county, shall be overseers of the same parish. In general all persons are liable to serve, with some exceptions as to peers of the realm, clergymen, parliament men, attornies, practising barristers, the president and members of the college of physicians, surgeons, and apothecaries free of the hall; dissenting ministers, prosecutors of felons, having a Tyburn ticket, and soldiers actually serving in the militia. In extensive parishes a greater number of overseers are appointed under 13 and 14 Charles II. c. 12, s. 21; and by 17 Geo. II. c. 38, if an overseer dies, removes, or becomes insolvent, the justices may appoint another, and their appointment is subject to appeal to the sessions. By 43 Elizabeth, c. 2, s. 2, overseers shall, within fourteen days after the appointment of new ones, deliver to them an account to be allowed by two justices, and pay over balances due from them, which, if not paid, may be levied by distress, and the party committed to prison by the justices until the balance is paid, and the account delivered in; and by 17 Geo. II. c. 38, the account is to be verified by oath. If he removes, the overseer is to account in like manner. If he dies, his executors have forty days to account, and must pay the balance before any other debts. Their duty consists in raising the poor's-rate, taking care of the poor, giving relief to casual poor, and removing persons who come to settle in a tenement under 10l. a year, &c. without a certificate. They are also to bind out the children of poor persons, and in that case the infant parish apprentice and his master cannot vacate the indentures without the overseers. They also are to procure orders of maintenance of bastards to be made, and bonds to be taken from the reputed father to indemnify the parish. It has been usual for overseers in those cases, instead of taking a bond of indemnity, to accept of a sum of money and discharge the father. But this has been lately held to be illegal, because it gives the overseers an interest to procure the death of the child. In cases of removal also overseers should be careful not to execute the order in a harsh or improper manner; for if a person die in consequence of a removal at a time of sickness, the overseer may be guilty of murder, and liable to an indictment. Overseers also should not improperly conspire to force persons who are with child of bastards to marry and relieve the parish, for this also is indictable. By 17 George II. c. 38, if any person shall be aggrieved by any thing done or omitted by the churchwardens and overseers, or by any of his Majesty's justices of the peace, he may, giving reasonable notice to the churchwardens or overseers, appeal to the next general or quarter sessions, where the same shall be heard, or finally determined; but if reasonable notice be not given, then they shall adjourn the appeal to the next quarter sessions; and the court may award reasonable costs to either party, as they may do by the 8 and 9th William, in case of appeals concerning settlements. (See POOR.) By 43 Elizabeth, c. 2, s. 2, they forfeit 20*s.* on neglecting to meet in the vestry one Sunday in the month; and by 13 and 14 Charles II. c. 4, forfeit 5*l.* for refusing relief to a person duly removed by warrant of two justices. By 9 George III. c. 37, s. 7, they are to forfeit 10*s.* or 20*s.* for paying the poor in bad money.

To OVERSE'T. *v. a.* (*over* and *set.*) 1 To turn bottom upward; to throw off the basis; to subvert (*Addison*). 2. To throw out of regularity (*Dryden*).

To OVERSE'T. *v. n.* To fall off the basis.

To OVERSHA'DE. *v. a.* (*over* and *shade.*) To cover with darkness (*Dryden*).

To OVERSHA'DOW. *v. a.* (*over* and *shadow.*) 1. To throw a shadow over any thing (*Bacon*). 2. To shelter; to protect (*Milton*).

To OVERSHO'OT. *v. n.* (*over* and *shoot.*) To fly beyond the mark (*Collier*).

To OVERSHO'OT. *v. a.* 1. To shoot beyond the mark (*Tillotson*). 2. To pass swiftly over (*Harte*). 3. To venture too far; to assert too much (*Whitgift*).

OVERSHOT WHEEL, in hydraulics, a wheel moved by the impulse of water falling upon or over it; an undershot wheel, on the contrary, being one in which the motion is communicated by the force of water running under it. See WATERWHEEL.

O'VERSIGHT. *s.* (*over* and *sight.*) 1. Superintendance (*Kings*). 2. Mistake; errour (*Hooker*).

To OVERSI'ZE. *v. a.* (*over* and *size.*) 1. To surpass in bulk (*Sandys*). 2. To plaster over (*Shakspeare*).

To OVERSKI'P. *v. a.* (*over* and *skip.*) 1. To pass by leaping (*Hooker*). 2. To pass over (*Donne*). 3. To escape (*Shakspeare*).

To OVERSLE'EP. *v. a.* (*over* and *sleep.*) To sleep too long.

To OVERSLI'P. *v. a.* (*over* and *slip.*) To pass undone, unnoticed, or unused; to neglect (*Wotton*).

To OVERSNO'W. *v. a.* (*over* and *snow.*) To cover with snow (*Dryden*).

OVERSO'LD. *part.* (*over* and *sell.*) Sold at too high a price (*Dryden*).

OVERSO'ON. *ad.* (*over* and *soon.*) Too soon (*Sidney*).

OVERSPE'NT. *part.* (*over* and *spend.*) Wearied; harassed (*Dryden*).

To OVERSPRE'AD. *v.a.* (*over* and *spread.*) To cover over; to fill; to scatter over (*Gen.*).

To OVERSTA'ND. *v. a.* (*over* and *stand.*) To stand too much upon conditions (*Dryden*).

To OVERSTA'RE. *v. a.* (*over* and *stare.*) To stare wildly (*Ascham*).

To OVERSTO'CK. *v. a.* (*over* and *stock.*) To fill too full; to crowd (*Swift*).

To OVERSTRA'IN. *v. n.* (*over* and *strain.*) To make too violent efforts (*Collier*).

To OVERSTRA'IN. *v. a.* To stretch too far (*Ayliffe*).

To OVERSWA'Y. *v. a.* (*over* and *sway.*) To overrule; to bear down (*Hooker*).

To OVERSWE'LL. *v. a.* (*over* and *swell.*) To rise above (*Fairfax*).

O'VERT. *v.* (*ouvert*, Fr.) Open; public; apparent (*King Charles*).

O'VERTLY. *ad.* (from the adjective.) Openly.

To OVERTA'KE. *v. a.* (*over* and *take.*) 1. To catch any thing by pursuit; to come up to something going before (*Hooker*). 2. To take by surprise (*Galatians*).

To OVERTA'SK. *v. a.* (*over* and *task.*) To burden with too heavy duties or injunctions (*Harvey*).

To OVERTHRO'W. *v. a.* (*over* and *throw.*) 1. To turn upside down (*Taylor*). 2. To throw down (*Milton*). 3. To ruin; to demolish (*Dryden*). 4. To defeat; to conquer; to vanquish (*Dryden*). 5. To destroy; to subvert; to mischief; to bring to nothing (*Sydney*).

OVERTHRO'W. *s.* (from the verb.) 1. The state of being turned upside down. 2. Ruin; destruction (*Hooker*). 3. Defeat; discomfiture (*Hayward*). 4. Degradation (*Shaks.*).

OVERTHRO'WER. *s.* (from *overthrow.*) He who overthrows.

OVERTHWA'RT. *a.* (*over* and *thwart.*) 1. Opposite; being over against (*Dryden*). 2. Crossing any thing perpendicularly. 3. Perverse; adverse; contradictious (*Clar.*).

OVERTHWA'RT. *prep.* Across: as, *he laid a plank* overthwart *the brook.*

OVERTHWA'RTLY. *ad.* (from *overthwart.*) 1. Across; transversely (*Peacham*). 2. Pervicaciously; perversely.

OVERTHWA'RTNESS. *s.* (from *overthwart*). 1. Posture across. 2. Pervicacity; perverseness.

To OVERTO'P. *v. a.* (*over* and *top*). 1. To raise above; to raise the head above (*Shakspeare*). 2. To excel; to surpass (*Harvey*). 3. To obscure; to make of less importance by superiour excellence (*Bacon*).

To OVERTRI'P. *v. a.* (*over* and *trip.*) To trip over; to walk lightly over (*Shakspeare*).

O'VERTURE. *s.* (*ouverture*, French.) 1. Opening; disclosure; discovery (*Shakspeare*). 2. Proposal; something offered to consideration (*Hayward*).

OVERTURE, in music, the introductory symphony to an oratorio, opera, &c. and generally consisting of three or four different movements. The overture is chiefly distinguished from the sonata, by consisting of less artificial melody, bolder masses of harmony, and stronger lights and shades.

To OVERTU'RN. *v. a.* (*over* and *turn.*) 1. To throw down; to subvert; to ruin. 2. To overpower; to conquer (*Milton*).

OVERTU'RNER. *s.* (from *overturn.*) Subverter (*Swift*).

To OVERVA'LUE. *v. a.* (*over* and *value.*) To rate at too high a price (*Hooker.*)

To OVERVE'IL. *v. a.* (*over* and *veil.*) To cover (*Shakspeare*).

To OVERWA'TCH. *v. n.* (*over* and *watch.*) To subdue with long want of rest (*Dryden*).

OVERWEA'K. *a.* (*over* and *weak.*) Too weak; too feeble (*Raleigh*).

To OVERWEA'THER. *v. a.* (*over* and *weather.*) To batter by violence of weather (*Shakspeare*).

To OVERWE'EN. *v. n.* (*over* and *ween.*) To think too highly; to think with arrogance (*Shakspeare*).

OVERWE'ENINGLY. *ad.* (from *overween.*) With too much arrogance; with too high an opinion.

To OVERWEI'GH. *v. a.* (*over* and *weigh.*) To preponderate (*Hooker*).

O'VERWEIGHT. *s.* (*over* and *weight.*) Preponderance (*Bacon*).

To OVERWHE'LM. *v. a.* (*over* and *whelm.*) 1. To crush underneath something violent and weighty (*Rogers*). 2. To overlook gloomily (*Shakspeare*).

OVERWHE'LMINGLY. *ad.* (from *overwhelming*). In such a manner as to overwhelm: not in use (*Decay of Piety*).

OVERWI'SE. *a.* (*over* and *wise.*) Wise to affectation (*Eccl.*).

OVERWO'RN. *part.* (*over* and *worn.*) 1. Worn out; subdued by toil (*Dryden*). 2. Spoiled by time (*Shakspeare*).

OVERWRO'UGHT. *part.* (*over* and *wrought.*) 1. Laboured too much (*Dryden*). 2. Worked all over (*Pope*).

OVERYEA'RED. *a.* (*over* and *year.*) Too old (*Fairfax*).

OVERYSCHE, a town of Austrian Brabant, seated on the Ysche, six miles N.E. of Brussels, and nine S.W. of Louvain. Lon. 4. 30 E. Lat. 50. 53 N.

OVERYSSEL, one of the former United Provinces, bounded on the E. by the bishopric of Munster, N. by Friesland and Groningen, on the W. by the Yssel, and on the S. by the county of Zutphen and bishopric of Munster. It is divided into three districts, called Drent, Twente, and Salland. There are many morasses in this province, and but few in-

habitants, in comparison with the rest. Its greatest riches consist in turf, which is dug up here, and sent to the neighbouring provinces, particularly Holland.

OVERZEA'LOUS. *a.* (*over* and *zealous.*) Too zealous (*Locke*).

OUGHT. *s.* (aphτ, Saxon.) Any thing; not nothing: more properly *aught* (*Milton*).

Ought. *verb. imperfect.* (preterit of *owe.*) 1. Owed; was bound to pay: have been indebted (*Spelman*). 2. To be obliged by duty: *subjects* ought *to obey the king* (*Bacon*). 3. To be fit; to be necessary: *the position* ought *to be proved* (*Locke*).

OUGHTRED (William), an eminent English mathematician and divine, was born at Eton in Buckinghamshire, 1573, and educated in the school there; whence he was elected to King's-college in Cambridge in 1592, where he continued about 12 years, and became a fellow; employing his time in close application to useful studies, particularly the mathematical sciences, which he contributed greatly, by his example and exhortation, to bring into vogue among his acquaintances there.

About 1603, he quitted the university, and was presented to the rectory of Aldbury, near Guildford in Surry, where he lived a long retired and studious life, seldom travelling so far as London once a year; his recreation being a diversity of studies: "as often," says he, "as I was tired with the labours of my own profession, I have allayed that tediousness by walking in the pleasant, and more than Elysian Fields of the diverse and various parts of human learning, and not of the mathematics only." About the year 1628 he was appointed by the earl of Arundel tutor to his son lord William Howard, in the mathematics, and his Clavis was drawn up for the use of that young nobleman. He always kept up a correspondence by letters with some of the most eminent scholars of his time, upon mathematical subjects: the originals of which were preserved, and communicated to the Royal Society, by William Jones, Esq. The chief mathematicians of that age owed much of their skill to him; and his house was always full of young gentlemen who came from all parts to receive his instruction: nor was he without invitations to settle in France, Italy, and Holland. "He was as facetious," says Mr. David Lloyd, "in Greek and Latin, as solid in arithmetic, geometry, and the sphere, of all measures, music, &c; exact in his style as in his judgment; handling his tube and other instruments at 80 as steadily as others did at 30; owing this, as he said, to temperance and exercise; principling his people with plain and solid truths, as he did the world with great and useful arts; advancing new inventions in all things but religion, which he endeavoured to promote in its primitive purity, maintaining that prudence, meekness, and simplicity were the great ornaments of his life."

Notwithstanding Oughtred's great merit, being a strong royalist, he was in danger, in 1646, of a sequestration by the committee for plundering ministers; several articles being deposed and sworn against him: but upon his day of hearing, William Lilly, the famous astrologer, applied to sir Bulstrode Whitlocke and all his old friends; who appeared so numerous in his behalf, that though the chairman and many other Presbyterian members were active against him, yet he was cleared by the majority. This is told us by Lilly himself, in the History of his own Life, where he styles Oughtred the most famous mathematician then of Europe.—He died in 1660, at 86 years of age, and was buried at Aldbury. It is said he died of a sudden ecstasy of joy, about the beginning of May, on hearing the news of the vote at Westminster, which passed for the restoration of Charles the 2d.—He left one son, whom he put apprentice to a watch-maker, and wrote a book of instructions in that art for his use.

He published several works in his life-time; the principal of which are the following:

1. Arithmeticæ in Numero & Speciebus Institutio, in 8vo. 1631. This treatise he intended should serve as a general key to the mathematics. It was afterwards reprinted, with considerable alterations and additions, in 1648, under the title of a Key to the Mathematics. It was also published in English, with several additional tracts: viz. one on the Resolution of all sorts of Affected Equations in Numbers; a second on Compound Interest; a third on the easy Art of Delineating all manner of Plain Sun-dials; also a Demonstration of the Rule of False-Position. A 3d edition of the same work was printed in 1652, in Latin, with the same additional tracts, together with some others, viz. On the Use of Logarithms: a Declaration of the 10th book of Euclid's Elements; a Treatise of Regular Solids; and the Theorems contained in the books of Archimedes.

2. The Circles of Proportion, and a Horizontal Instrument; in 1633, 4to; published by his scholar Mr. William Foster.

3. Description and Use of the Double Horizontal Dial; 1636, 8vo.

4. Trigonometria: his treatise on Trigonometry, in Latin, in 4to. 1657: and another edition in English, together with Tables of Sines, Tangents and Secants.

He left behind him a great number of papers upon mathematical subjects; and in most of his Greek and Latin mathematical books there were found notes in his own hand writing, with an abridgment of almost every proposition and demonstration in the margin, which came into the museum of the late William Jones, Esq. F. R. S. These books and manuscripts then passed into the hands of his friend sir Charles Scarborough the physician; the latter of which were carefully looked over, and all that were found fit for the press printed at Oxford in 1676, in 8vo. under the title of

5. Opuscula Mathematica hactenus inedita. This collection contains the following pieces: (1), Institutiones Mechanicæ: (2), De Variis Corporum Generibus Gravitate & Magnitudine

comparatis: (3), Automata: (4), Quæstiones Diophanti Alexandrini, libri tres: (5), De Triangulis Planis Rectangulis: (6), De Divisione Superficierum: (7), Musicæ Elementa: (8), De Propugnaculorum Munitionibus: (9), Sectiones Angulares.

6. In 1660, sir Jonas Moore annexed to his Arithmetic a treatise entitled, Conical Sections; or, the several Sections of a Cone; being an Analysis or Methodical Contraction of the two first books of Mydorgius, and whereby the nature of the Parabola, Hyperbola, and Ellipsis, is very clearly laid down. Translated from the papers of the learned William Oughtred.

Oughtred, though undoubtedly a very great mathematician, was yet far from having the happiest method of treating the subjects he wrote upon. His style and manner were very concise, obscure, and dry; and his rules and precepts so involved in symbols and abbreviations, as rendered his mathematical writings very troublesome to read, and difficult to be understood. Beside the characters and abbreviations before made use of in Algebra, he introduced several others: as

× to denote multiplication;

: : for proportion or similitude of ratios;

∺ for continued proportion;

⊐ ⊏ } for greater and less; &c.

(*Hutton's Math. Dict.*)

OVIDIUS NASO (P.), a celebrated Roman poet; born at Sulmo. As he was intended for the bar, his father sent him early to Rome, and removed him to Athens in the sixteenth year of his age. But as he was born a poet, nothing could deter him from pursuing his natural inclination. Every thing he wrote was expressed in poetical numbers. A lively genius and a fertile imagination soon gained him admirers; the learned became his friends; Virgil, Propertius, Tibullus, and Horace honoured him with their correspondence, and Augustus patronized him with the most unbounded liberality. These favours, however, were but momentary, as the poet was soon after banished to Tomos on the Euxine sea, by the emperor. The true cause of this sudden exile is unknown. In his banishment, Ovid betrayed great pusillanimity, and prostituted his pen and his time to adulation, yet the emperor proved deaf to all entreaties. Tiberius proved as regardless as his predecessor to the entreaties which were made for Ovid, and the poet died in the 7th or 8th year of his banishment, in the 59th year of his age, A.D. 17, and was buried at Tomos.

The greatest part of Ovid's poems are remaining. His Metamorphoses, in 15 books, are extremely curious, on account of the great variety of mythological facts and traditions which they relate, but they can have no claim to epic honours. In composing this the poet was more indebted to the then existing traditions, and to the theogony of the ancients, than the powers of his own imagination. His Fasti were divided into twelve books, like the constellations in the zodiac, but of these six are lost: and the learned world have reason to lament the loss of a poem which must have thrown so much light upon the religious rites and ceremonies, festivals and sacrifices, of the ancient Romans, as we may judge from the six that have survived the ravages of time and barbarity. His Tristia, which are divided into five books, contain much elegance and softness of expression; as also his Elegies on different subjects. The Heroides are nervous, spirited, and diffuse; the poetry is excellent, the language varied, but the expressions are often too wanton and indelicate, a fault which is very common with him. His three books Amorum, and the same number de Arte Amandi, with the other de Remedio Amoris, are written with peculiar elegance, and contain many flowery descriptions; but the doctrine which they hold forth is dangerous, and they are to be read with caution, as they seem to be calculated to corrupt the heart, and to sap the very foundations of virtue and morality. His Ibis, which is written in imitation of a poem of Callimachus of the same name, is a satyrical performance. Besides these, there are extant some fragments of other poems, and among these part of a tragedy called Medea. The talents of Ovid as a dramatic writer have been disputed, and some have remarked that he who is so often void of sentiment was not born to shine as a tragedian. He has attempted, perhaps, too many sorts of poetry at once. On whatever he has written, he has totally exhausted the subject. He every where paints nature with a masterly hand, and adds strength even to vulgar expressions. It has been judiciously observed, that his poetry after his banishment from Rome was destitute of that spirit and vivacity which we admire in those which were written before. His Fasti are perhaps the best written of all his poems; and after them we may fairly rank his love verses, his Heroides, and after all his Metamorphoses, which were not totally finished when Augustus banished him. His Epistles from Pontus are the language of a weak and sordid flatterer. However critics and moralists may have cause to censure the indelicacy and inaccuracies of Ovid, it is to be acknowledged that his poetry contains great sweetness and elegance. How painful the reflection that sweetness and elegance of style should ever be employed, to take off the disgust that would naturally attend obscenity, and render poison palatable!

The Editio Princeps of Ovid is remarkable for being likewise the first production of the Bologna press, and a fine specimen of the typographical talents of Balthasar Azzoguide. It is in 2 vols. folio, date 1471. Other valuable editions are, Jac. Rubeus. Venet. fol. 1474. Lichtenstein. Vincent. fol. 1480. Aldus. Venet. 1502. 3 vols. Wechel. Francof. fol. 1601. P. Burmanni Amst. 4to. 1727. 4 vols. The latter, in the opinion of Harwood, is "the chef d'ouvre of Burman, and one of the noblest and correctest of the Dutch classics."

OVIDUCT. (*oviductus*, from *ovum*, an egg, and *ductus*, a canal.) The Fallopian tube, or canal, which runs from the ovary to the bottom of the womb.

OVIEDA. In botany, a genus of the class didynamia, order angiospermia. Calyx five-cleft; corol superior, very long, cylindrical, with the border three-lobed; berry globular, one-celled, four-seeded. Two species; natives of Hispaniola and Java.

OVIEDO, a town of Spain, capital of Asturia d'Oviedo, with a bishop's see, and a university. It is seated at the confluence of the Ove and Deva, which form the Asta, 50 miles N.W. of Leon. Lon. 5. 44 W. Lat. 43. 25 N.

OVIFORM. *a.* (*ovum* and *forma*, Lat.) Having the shape of an egg (*Burnet*).

OVIPAROUS. *a.* (*ovum* and *pario*, Lat.) Bringing forth eggs; not viviparous (*Ray*).

OVIS. Sheep. In zoology, a genus of the class mammalia, order pecora. Horns hollow, wrinkled, turned backwards, and outwards into a circular or spiral form: fore-teeth, lower eight; tuskless. These are gentle, harmless, and useful, supplying food and raiment; prefer open plains; not very active; fight by butting each other with the head reclined; threaten by stamping the ground with the feet; drink little; females gravid five months, bring one or two, rarely three young. Four species according to Linnéus; three according to Shaw, who makes O. strepsiceros, or the Cretan sheep, a mere variety of O. aries, though a distinct species in the former. We shall in this respect follow Dr. Shaw's arrangement.

1. O. aries. Common sheep. Horns compressed, lunate. Fourteen varieties.

α Hornless sheep. Hornless; tail and scrotum hanging as low as the knees.

β Black-faced sheep. Horned; tail short; wool short, coarse.

γ Spanish sheep. Horns spiral, lengthened outwards; wool fine, plentiful.

δ Many-horned sheep. Horns more than two.

ε African sheep. Hair instead of wool, short.

ζ Guinea sheep. Ears pendulous; dewlaps lax, hairy; hind part of the head prominent.

η Broad-tailed sheep. Tail long, very broad.

θ Fat-rumped sheep. Ears large, pendulous; large, fatty cushions on the hips; tailless.

ι Bucharian sheep. Ears large, pendulous; cushions on the hips less, tail long, flat.

κ Long-tailed sheep. Tail very long, woolly.

λ Cape sheep. Ears large, pendulous; tail large, broad.

μ Bearded sheep. Beard long, divided, hanging from the lower parts of the cheeks and upper jaw.

ν Mervant. Beard long on the fore part of the breast; neck with a short mane.

ξ Cretan sheep. Horns erect, carinate, spirally twisted; wool long, hairy. In Linnéus a distinct genus.

Inhabits the whole globe; changes its teeth with its age; feeds on short tender grass, chiefly sheep's fescue; has a peculiar tone which is called bleating. The ram is esteemed the best-shaped that has a thick head, a broad front, large black eyes, a broad nose, a long, high body, a large crupper and large reins, massy testicles, and a long tail. His colour should be white; his fleece full and heavy. Those ewes are preferred which have thick necks, large, soft, and silky fleeces, large bodies, and a nimble motion in walking. One ram suffices for fifty ewes.

Sheep are not among the most sagacious of the lower animals. They neither display the same natural dexterity and address, nor the same docility as the dog, the horse, and some other of the tame animals, whose mental powers are considered as the most remarkable. Yet, they are not absolutely stupid, as they have sometimes been represented. They are social: the flock follow a ram as their leader; the leader often displays the most impetuous courage in defence of his followers. Dogs, and even men, when attempting to molest a flock of sheep, have often suffered from the generous valour of the rams. The mutual affection, at least, between the female parent and her progeny, is here sufficiently tender, and well adapted to its purposes. The ewe suckles her lamb with fondness: and though her timidity, weakness, and want of formidable instruments of attack and defence, render her unable to make any powerful opposition to those who seek to deprive her of it; yet she bleats after it, and for some time laments its loss with the tenderest complaints. A lamb separated when young from other sheep, fed with milk from the hand, and treated with tenderness and familiarity, displays considerable docility, and often forms a strong attachment to its benefactors Admitted to this intimacy with mankind, it is apt to be guilty of little, vicious tricks; but its mildness and general inoffensiveness of manners recommend it so strongly to human affection and regard, that it is usually a particular favourite of infancy and youth. It often eludes the vigilance of the shepherd, when it wishes to steal some delicacy of food agreeable to its palate.

The ram becomes able to propagate his kind at the age of eighteen months: the ewe is ready to receive the male when a year old. The period at which the ewes are in season for the ram is between the beginning of September and the end of November; but if fed in good pastures, or nourished on purpose with stimulating food, they will conceive at any time in the year. It is best to permit them to mix with the rams at such a time, that they may bring forth when there is the greatest abundance of grass for feeding the lambs produced. In this country, the first lambs usually appear in the beginning of February; and their number continues to increase, at least till May. The rams and the ewes are to be kept separate, when it is wished that they should not copulate.

The ewe usually produces only one lamb at a time. There are generally, however, a good many instances of two in a flock; and on some very singular occasions, one parent will produce three lambs at a birth. It is observable of this species, that they drink very little. The juice of the vegetables which they eat, and the dew and rain with which the grass is often moistened, supply almost all the moisture that they need.

Sheep, like other animals, are liable to various diseases. Water often collects in the head, and produces a disorder which soon proves fatal: the feet of whole flocks are often affected with a sort of mortification, which makes them halt when they walk, and renders them almost unable to run: they are subject to the scab, and an eruptive disorder like the small-pox.

The dropsy, consumption, jaundice, and worms

in the liver, are also annually destructive to considerable numbers of sheep. Several sorts of insects infest this animal. A particular species of oestrus or gadfly is very troublesome by depositing its eggs above the nose, in the frontal sinuses: a tick and a louse likewise feed on the sheep; of which it is sometimes relieved by the undistinguishing appetite of the magpie and the starling. The ordinary term of the life of those sheep which escape disease and violence is twelve or thirteen years.

The benefits which mankind owe to this animal are very numerous. Its horns, its fleece, its flesh, its tallow, even its bowels, are all articles of great utility to human life.

The horns are manufactured into spoons, and many other useful articles.

The manufacture of the wool into cloths has long formed the principal source of the riches of England. We know not indeed whether the simple Britons and the rude Saxons were acquainted with the important uses of wool; it is more probable that they were not. But Henry the Second paid so much attention to the manufacture and improvement of this commodity, as to forbid the use of any other than English wool in the making of cloth. Yet, the excellence of English wool was long known before the English paid much attention to the art of making woollen cloth, or attained any superior skill in it. Wool was then a staple article for exportation; and the Flemings were our merchants. But in the reign of Elizabeth, several favourable circumstances, which the talents and the patriotic spirit of that princess enabled her to take advantage of, concurred to establish the woollen manufactory in England, and to lay the foundation for that perfection it has since attained. In Scotland this manufacture has never thriven greatly. Yet, the bonnets, which, though now very much out of use, were in former times very generally used as a covering for the head, and the stockings of such superior fineness, for which the isles of Shetland and the city of Aberdeen are still celebrated, are articles which shew that the inhabitants of Scotland have not been much less capable of ingenuity in this way than their neighbours of England. The Spanish wool has been much celebrated; and it is not very long since broad cloth bearing the name of Spanish was prized above the English. But the wool produced in Britain has been, by various arts, so much improved as to be now not inferior in excellence to that of Spain; and no woollen cloth is at present esteemed superior to that of English manufacture. The sheep with the finest fleeces in England are fed on the Coteswold Downs, and in Herefordshire, Devonshire, Lincolnshire, Suffolk, and Yorkshire. The wool of Wales is coarse; nor is that of Scotland, except in some instances, remarkable for fineness. The wool of the small sheep in the Highlands and the isles of Scotland is superior to the finest Spanish or English wool.

The skin of this animal is prepared into leather for an inferior sort of shoes, for the coverings of books, for gloves, and for parchment.

The entrails, by a proper preparation, are made into strings for various musical instruments.

The milk of the sheep is thicker than cow's milk. Its taste is somewhat disagreeably strong. It is hence rather made into cheese than used for drinking. The cheese is rich, and of a high flavour. It would probably be still better, if more attention were paid to cleanliness in the preparation. It were perhaps best to leave all the milk of the ewe to her lamb.

The flesh of the sheep is one of our most valuable articles of animal food. It is neither disagreeably coarse, nor yet so tender and delicate as not to afford strengthening nourishment. The flesh of the lamb is, in the proper season, one of the nicest delicacies that the epicure can desire.

The bones are useful for various purposes. Of these, as well as of other bones calcined, are made the cupels used in the refining of metals.

Mr. Pennant mentions the dung as an excellent manure. But it is not often that sheep are fed in such numbers on arable lands as that their dung can be collected for this purpose.

The modes of managing sheep differ in different countries, and even in the same country. The lambs are seldom separated from their mothers till they become large and vigorous. As one ram is able to impregnate a good many ewes, only a small proportion of the male lambs are permitted to retain their organs of generation unmutilated. Wedders are less vicious than rams, and their flesh has a better flavour and relish. In summer, before being shorn, sheep are commonly washed, to improve the whiteness of the wool. Where sheep are not shorn, they change their fleeces annually; and the best time for shearing is when the fleece is just ready to fall off of itself. The time of the sheep-shearing is always a period of festivity with the shepherds. It was such in ancient times among the shepherds of Judæa 2 Sam. xiii. 23. In Scotland, and in other northern countries, sheep are usually smeared with a mixture of butter and tar about the end of autumn, to fortify and protect them against the severities of winter. It seems a necessary precaution, where the flocks cannot be sheltered in sheds, and fed with hay and other suitable food, during the inclemency of the severe season. But this mixture of tar and butter is often so injudiciously laid on, as to injure the health of the sheep and even to render its fleece less warm than it would otherwise be. It greatly contaminates the whiteness of the wool;—but if the butter be in due proportion, is, perhaps, rather favourable to its fineness. In the sheep countries of Scotland, it is often necessary to remove the flocks in winter from the hills on which they usually feed, to low lands, where they may find some herbage, and be protected from the severity of the season. Could the practice of folding sheep in sheds, and feeding them with hay, or leaves of cabbage, common green kail, or turnips, during the storms of winter, be conveniently adopted through Scotland, it would possibly prove highly advantageous to their proprietors. Even in the mildest winters, considerable numbers perish under the present modes of management. Crawford muir, in Clydesdale, is one of the chief sheep countries in Scotland. The management of sheep is there well understood.—The natives of Clydesdale have of late attempted to teach the inhabitants of the Highlands how to manage their sheep better, and to derive greater profits from them.

Even in Britain we have a good many different breeds of this animal. Linnéus distinguishes the breed peculiar to England, as destitute of horns, and having its tail and scrotum depending to the knees. This is the fine, large breed for which Warwickshire, and particularly Lincolnshire, is noted. They have, in the course of the last twenty years, been introduced into Galloway and

other parts of Scotland, under the denomination of mugg sheep. Their flesh is rather coarse, and their wool intermixed with dry hair. It is the hornless sheep of Pennant.

Our other sheep are chiefly of the common horned breed. In Wales, and through most of the sheep pastures in Scotland, they are small and hardy. In delicacy of flavour and relish, their flesh is much superior to that of the larger breed; and even their wool, where the nature of their pasture is not such as to injure it greatly, is said to be of the best quality. The common colour is white; yet we sometimes observe a black, or a dark grey fleece, and a smutted face: this is called the common sheep, as being more common than any other variety of the species, throughout all Europe. Some ancient writers speak of a breed of sheep with golden teeth, as belonging to Scotland. This appears, at first sight, incredible; but Mr. Pennant has explained the wonder, by telling us, that he saw at Athol house, in the year 1772, the jaws of an ox, containing teeth thickly incrusted with a gold-coloured pyrites. The same thing might happen to sheep.

The northern regions of Europe, particularly Gothland and Iceland, afford another variety of the sheep, distinguished by having their heads furnished with three, four, or even five horns, the variety δ. Besides this abundance of horns, the sheep of Iceland are remarkable for straight, upright ears, and very small tails. In stormy weather, the sheep of Iceland, by a peculiar instinct, retreat for shelter to the caves and caverns, which are very numerous over the face of that island; but when a storm of snow comes on too suddenly to afford them time to gain such a retreat, the flock gather into a heap, with their heads towards the middle, and inclined to the ground; a posture in which they will remain several days, without perishing under the snow. Among the herbs on which they feed, the inhabitants of Iceland remark that scurvy-grass contributes most to fatten them. When the summer crop happens to fail, the Icelanders are obliged to feed their sheep in winter with chopped fish bones. Those sheep appear to afford milk in more abundance than ours. Dr. Van Troil says, they give from two to six quarts a-day. The fleece is not shorn from the sheep in that island as with us: about the end of May, it loosens of itself, and is stripped off at once, like a skin.

The Spanish sheep, remarkable for the fineness of their wool, and distinguished by spiral horns, bending outwards, are of a breed believed by some writers to have been originally introduced into that kingdom from England. Mention is made, indeed, of two varieties of Spanish sheep; one of which is highly valued for the fineness and quantity of the wool, while the fleece of the other is of a very inferior quality. The greater part of the flocks in Spain are of the former variety; and the care with which they are managed renders the business of the shepherd much more complex in Spain than in most other countries. The number of sheep fed in Spain is above four millions. In summer, the flocks feed on the mountains in the northern parts of the kingdom; in winter, they are conducted into the milder plains of Estremadura and Andalusia, and distributed into districts. A flock consists usually of about ten thousand sheep, under the management of a head shepherd, with fifty inferior shepherds, and as many dogs. In summer, the sheep are made to eat a great quantity of salt. The rams are, as is usual in other places, kept in separate flocks, except during the rutting time. This begins about the end of July; and they are then distributed about the ewes. The fleece of a ram frequently weighs about five-and-twenty pounds; that of a ewe scarce ever more than five: but the wool of the ram is not equally fine with that of the ewe. In the middle of September the shepherds mark the sheep of their flocks on the loins, with ochre diluted in water. This smearing with ochre not only distinguishes the sheep of different proprietors, but is also supposed to render the wool closer and warmer, and to contribute to the preservation of the sheep's health. The end of September is the period about which the flocks are conducted from the mountainous pastures where they have spent the summer, to milder and lower regions. The shepherds are careful to conduct each flock, if possible, to the same pastures where it has fed in former winters. The lambs are produced early in the season, in consequence of the rams having been admitted to the ewes about the end of July. In March, the lambs are trimmed of a part of their tails, and the tips of their horns; and marked on the nose with a hot iron; and such of the males as are not meant to be kept for rams, castrated or at least incapacitated for generation, by squeezing of the scrotum, till the spermatic vessels are twisted like a rope. In April, the flocks are led back to their summer pastures. In May, the fleeces are shorn: every fleece contains three sorts of wool; the finest on the back and the belly; a second sort on the neck and the sides; and on the breasts, the shoulders, and the thighs, a coarser species. Considerably more than 9,700,000 lb. weight of wool are annually exported from Spain during peace; of which, notwithstanding the abundance and the superior quality of our British wool, more than one-third has usually come to England.

The African and Guinea sheep form remarkable varieties of this species. Guinea and the desert of Sahara are the places of which they are originally natives, and whence they have been introduced into America. Their form is meagre; their legs long; ears pendent, and convered, not with wool, but with hair; the neck is shaggy; and the covering of the whole body has so much of the dryness and hardness of hair, that it cannot be with any propriety denominated wool. These are conjectured to be the animals named by Leo Africanus Adimain, and described by him as being of the size of an ass, and of the shape of a ram, with pendent ears.

The Cretan sheep mentioned by Buffon under the denomination of Wallachian, is remarkable for large spiral horns. The distance between the horns of the ewe enlarges towards their tops: those of the ram are parallel. They are understood to be natives of Candia; numerous flocks of them graze on Mount Ida: they are also spread through the other islands of the Archipelago, and are frequent in Austria and Hungary. The butchers in these last mentioned countries prefer them to all other sheep. In size, and in the nature of the fleece, they differ not remarkably from the common kind.

Those countries of Asia which abound most in sheep afford yet another variety, distinguished by the amazing breadth and bulk of their tails.

They do not, as far as we know, differ considerably from our common sheep, in any other respects. They are generally white; yet some-

times vary in colour. The tail is seldom pointed, but commonly either square or round, much like a cushion. The great size of the tail renders it often so incommodious to the sheep, that it is found necessary to support it with a small wheeled machine. Some of these tails weigh more than 50lb.; the common weight exceeds 30lb. Persia, Assyria, Arabia, Egypt, Ethiopia, Barbary, and Tartary, all afford this variety.

Of these sheep with large tails, the tails are not all of the same form: some are short and thick, others broad, and of a moderate length: others so remarkably long, as to obtain to the sheep that carry them the denomination of long-tailed sheep. The short, thick-tailed sheep are common among the Tartars. Thibet affords the broad-tailed sheep; which are in that kingdom distinguished likewise for the superior fineness of their wool. This wool, not inferior in quality to that of Caramania, is, like it, wrought into shawls for the great omrahs, which are sold at a higher price than those of any other manufacture. The long-tailed sheep form the flocks of the Dutch colonists at the Cape of Good Hope. Mr. Patterson, who advanced from the Cape a considerable way into the inland country, relates, that he saw among the Hottentots, in the country adjacent to Orange River, a sort of sheep with much longer tails than those of the sheep about the Cape, and covered, not with wool, but with coarse hair, which gave them, at a distance, the appearance rather of dogs than of sheep. The Cape sheep are not less distinguished by their ears, which are large and pendent, than by their tails. The tail, in its nature between fat and marrow, is a delicacy worthy of the nicest epicure. This variety of the sheep was not unknown to the ancient Greeks and Romans. Aristotle mentions them as inhabitants of Syria; and Pliny, probably on Aristotle's authority, repeats the same fact.

Another variety of this species is the fat rumped sheep, which is not provided with a tail. Its buttocks swell out like two globes, are perfectly smooth, and scarce leave the os coccygis discernible. Its nose is arched; its ears pendulous; legs slender; head black; fleece commonly white, but at times black, reddish, or spotted. The globular buttocks are composed solely of suet, and are sometimes so large as to weigh forty pounds. The whole body of the sheep frequently weighs two hundred pounds. The voice of this animal resembles rather the lowing of a calf than the bleating of a sheep.

Sheep of this character abound through the deserts of Tartary, from the Volga to the Irtish and the Altaic chain. They are remarkably prolific; producing usually two, and not unfrequently three lambs at a birth.

The sheep of Bucharia are described by Linnéus and Pallas as a particular variety; distinguished by large pendent ears, and a large tail, formed like a cushion. These are represented as a hybrid breed, produced by the copulation of individuals of the long-tailed variety with others, either with broad tails, or of the variety distinguished by the want of a tail. Lambs skins, possibly of this variety, are brought from Bucharia, Chiva, and the adjacent countries, to Astracan, and there sold at a very high price, on account of their glossy appearance and furry texture. The wool of some of them is curled, that of others waved. They are used in Persia, Russia, and other parts, for the lining of coats, and the turning up of caps. These are chiefly the skins of lambs taken out of the bellies of ewes killed during the period of gestation. The instant the lamb is taken out of its mother's belly, it is killed and flayed. Lambs are also killed for their skins, in the same manner, immediately after being brought forth in the natural way; and these are scarce inferior to the others. One of these skins will sell at Astracan for five or six shillings sterling. They are usually grey or black. For the rest, see HUSBANDRY.

2. O. ammon. Argali or Siberian sheep. Horns arched, semicircular, above wrinkled, flattish beneath, dew-laps [illegible], colour in summer brownish-ash mixed with grey; beneath whitish-grey; tail short, white, brownish at the tip; hair long in winter, shed in spring; ears erect, acute; hind feet longer than the fore.

Another variety with body brown mixed with tawny; a white mark on each side pointing to the belly. The females are smaller than the males. These, as well as our common sheep, sometimes want horns.

Siberia, Kamtschatka, and the Kurili Islands, are the favourite regions of the wild sheep. They are social animals, and feed together in small flocks. They are the most useful animals that the Kamtschadales possess. These rude people have not indeed attempted to domesticate the argali; but they spend the summer in hunting them on the wild and precipitous mountains on which they feed. Sometimes they set loaded cross-bows in the paths through which they expect the argali to pass, in such a position, that when the animal treads on a certain string belonging to the bow, the arrow is discharged, and lodged in its bowels. Sometimes they employ dogs in the chace. The dog never overtakes the wild sheep; but while the sheep's attention is engaged by the dog, the hunter, without being observed, approaches near enough to shoot him with a ball or an arrow. The Kamtschadales clothe themselves with the skins of these animals, and eat their flesh, esteeming it a delicacy fit for the banquets of the gods.

The Mongols and Tongooses are likewise acquainted with the argali, and not less fond of hunting them than the Kamtschadales. They, however, attack them in a different manner. They take out against them a great multitude of dogs and horses, and strive to surround the flocks before they are aware: but this is not easy; for the argali is so swift and so cunning, that when it distinguishes, either by sight or smell, the approach of an enemy, it infallibly makes its escape.

Father Rubruquis, who visited the nations of Tartary as ambassador from St. Louis, in the relation of his travels mentions this animal under the name of artack, and tells us, that he could scarcely lift a pair of its horns with one hand.

This animal is ascribed by the ancients to Spain, Sardinia, and Corsica; and still exists in Sardinia and Corsica. Several pairs have been imported from these islands into Britain.

General Paoli, who, after making a brave but ineffectual effort to vindicate and establish the liberties of his country, found an honourable asylum in Britain, imported from Corsica a male animal of this kind, named Martino. Martino died at the age of four years. His horns were then twenty-two inches long; but the poor animal happened to be ill used in the latter part of his life,—otherwise his horns would have been considerably longer.

The Corsicans call the male mufro, the female

musfra. They inhabit the highest tracts of country in the island and can only be shot or taken by stratagem; and such is their wildness, cunning and velocity, that the old ones can never be taken alive. They feed on the most acrid plants. When tame, they eat tobacco, and drink wine. Their flesh, though always lean, is savoury and agreeable to the taste. The skin is thick, and is used in Sardinia, both as an under shirt, for a preservative against the noxious effects of bad air, and as a surtout, to defend the body against the impression of thorns and briars, in passing through thickets.

If we may credit Hector Boece, these animals were once inhabitants of the British isles. He ascribes to St. Kilda a species, of which his description nearly agrees with the argali. To confirm his account which might otherwise perhaps not obtain credit, a figure of a musmon as it is denominated by Pliny has been discovered in a piece of Roman sculpture, taken from Antoninus's wall near Glasgow.

The old rams of this species are very strong. It is with difficulty that even ten men can hold one of them. They quarrel like the rams in our flocks of common sheep; and in their quarrels one often strikes the other down a precipice, where he is instantly dashed in pieces. The horns of two or more are sometimes accidentally entangled; in which case they fall down and perish together. The young are easily tamed. They produce with the common sheep; and it is said that the progeny are not barren.

3. O. pudu. Horns round, smooth, divergent. The lofty range of mountains in South America [illegible] the Cordilleras afford a habitation to this species. It is of the size of a large kid, and similar in form to the domestic goat; yet distinguished from that animal, by having,—the male, small horns, bending outwards, while the female is without that ornament; both are beardless and smooth on the chin. These animals are known in America by the name of pudu; they feed together in flocks: in the mildest months they frequent the summits of the mountains; but retire from the severities of winter into the vallies, where they are easily taken, and when taken of whatever age, it is not difficult to domesticate them.

The bearded sheep, or Siberian goat of Pennant, which that naturalist represents as remarkable for a divided beard, seems to be merely a variety of this same species. It is described as having its horns almost joined at the base, diverging and bending outwards, with their points nineteen inches distant from each other; twenty-five inches in length; and, at the thickest place, eleven in circumference. Its tail is very short; its breast, neck, back, and sides, are of a pale ferruginous colour. This animal is said to inhabit the mountains of Barbary: some individuals of the kind have also been discovered on the mountains of Asia; and the tragelaphus, represented by Pliny as an inhabitant of the banks of the river Phasis, is thought by naturalists to belong to this variety of the sheep.

OUNCE, a little weight, the 16th part of a pound avoirdupois, and the 12th part of a pound Troy. The word is derived from the Latin, *uncia*, the twelfth part of any whole, called *as*; particularly in geometrical measures, an inch, or the 12th part of a foot. See INCH and AS.

OUNCE, in zoology. See FELIS.

OUNDLE, a town in Northamptonshire, with a market on Saturday; seated on the Nen, over which are two bridges, 26 miles N. E. of Northampton, and 83 N. by W. of London. Lon. 0. 42 W. Lat. 52. 26 N.

OVOLO, or OVUM, in architecture, a round moulding, whose profile or sweep, in the Ionic and composite capitals, is usually a quadrant of a circle: whence it is also commonly called the quarter-round. It is usually cut with representations of eggs and arrow heads, or anchors placed alternately.

OUPHE. *s.* (*auff*, Teutonic.) A fairy; a goblin (*Shakspeare*).

OUPHEN. *a.* (from *ouphe*.) Elfish (*Shakspeare*).

OUR. *pron. poss.* (upe, Saxon.) 1. Pertaining to us; belonging to us (*Shakspeare*). 2. When the substantive goes before, it is written *ours* (*Davies*).

OURANG OUTANG, in mastiology. See SIMIA.

OUREM, a town of Portugal, in Estremadura, with a castle, on a mountain, between the rivers Leria and Tomar. Lon. 7. 40 W. Lat. 39. 54 N.

OURIQUE, a town of Portugal, in Alentejo, celebrated for a victory, obtained by Alphonso, king of Portugal, over five Moorish kings, in 1139. The heads of these five kings are the arms of Portugal. It is 26 miles S.W. of Beja.

OURSELVES. *reciprocal pronoun.* 1. We; not others (*Locke*). 2. Us; not others, in the oblique cases (*Dryden*).

OURSELF is used in the regal style (*Sh.*).

OURTHE, or OURT, a new department of France, including the southern part of Liege and of Limburg, and the N.E. part of Luxemburg. It has its name from a river, which flows into the Meuse, above Liege, the capital of the department.

OUSE, or OOSE. Tanners' bark.

OUSE, a river in Yorkshire, formed of the Ure and Swale, which rise near each other in the romantic tract called Richmondshire, and unite at Aldborough. It thence takes the name of Ouse, and flows through York, where it is navigable for considerable vessels; and afterward receiving the Wharf, Derwent, Aire, and Don, it meets the Trent on the borders of Lincolnshire, where their united streams form the Humber.

OUSE, a river in Sussex, formed of two branches, one of which rises in St. Leonard forest, the other in the forest of Worth, and they unite above Lewes. It flows by that town to Newhaven, below which it forms a considerable haven, and enters the English channel.

OUSE (Great), a river which rises in Northamptonshire, near Brackley, and flows to Buckingham, Stoney Stratford, Newport Pagnel, Olney, and Bedford, where it is navigable. Thence it proceeds to St. Neots, Huntingdon, St. Ives, Ely, and Lynn, below which it enters the Lincolnshire wash.

Ouse (Little), a river which rises in the south part of Norfolk, and dividing that county from Suffolk, as it flows westward, becomes navigable at Thetford, and afterward joins the Great Ouse.

OUSEL (Philip), of Dantzic, became protestant minister at Leyden, and afterwards theological professor at Frankfort on Oder, where he died, 1724, aged 53. He was well skilled in Hebrew literature, and published Introductio in accentuationem Hebræorem metricam, 4to. in which he supports that the Hebrew points and accents are as old as the bible—de accentuatione Hebræorum prosaicâ, 8vo. &c.

To OUST. *v. a.* (*ouster*, French.) 1. To vacate; to take away (*Hale*). 2. To deprive; to eject (*Lesley*).

OUSTER, or Dispossession, in law, an injury which carries with it the amotion of possession; for by means of it the wrong doer gets into the actual possession of the land or hereditament, and obliges him that hath a right to seek a legal remedy, in order to gain possession, together with damages. This ouster may either be of the freehold by abatement, intrusion, disseisin, discontinuance, and deforcement; or of chattels real, as an estate by statute-merchant, statute-staple or elegit, or an estate for years.

Ouster le main, *amovere manum*, in law, denotes a livery of lands out of the king's hands; or a judgment given for him that traversed, or sued, a monstrans le droit. When it appeared, upon the matter being discussed, that the king had no right or title to the land seized, judgment was given in chancery, that the king's hand be amoved; and ouster le main, or amoveas manum, was therefore awarded to the escheator, to restore the land, &c. All wardships, liveries, ouster le mains, &c. are now taken away and discharged by statute 12 Car. II.

OUT. *ad.* (ut, Saxon.) 1. Not within: *the stag is out* (*Prior*). 2. It is generally opposed to *in* (*Shakspeare*). 3. In a state of disclosure: *the leaves are out* (*Bacon*). 4. Not in confinement or concealment: *murder will out* (*Shakspeare*). 5. From the place or house (*Shakspeare*). 6 From the inner part (*Ezek.*). 7. Not at home: *I was out*. 8. In a state of extinction: *the fire is out* (*Shakspeare*). 9. In a state of being exhausted: *the provision is out* (*Shakspeare*). 10. Not in office: *the minister is out* (*Shakspeare*). 11. To the end: *hear him out* (*Dryden*). 12. Loudly; without restraint (*Pope*). 13. Not in the hands of the owner: *my horse is out, I have lent him* (*Locke*). 14. In an error (*Swift*). 15. At a loss; in a puzzle (*Bacon*). 16. With torn clothes (*Dryden*). 17. Away, so as to consume (*Taylor*). 18. Deficient: *he was out fifty pounds* (*Fell*). 19. It is used emphatically before *alas* (*Suck.*). 20. It is used emphatically to verbs of discovery (*Numbers*).

Out. *interj.* An expression of abhorrence or expulsion. It has sometimes *upon* after it (*Shakspeare*).

Out of. *prep.* 1. From; noting produce (*Spenser*). 2. Not in; noting exclusion, dismission, absence, or dereliction (*Pope*). 3. No longer in (*Dryden*). 4. Not in; noting unfitness (*Dryden*). 5. Not within; relating to a house (*Shakspeare*). 6. From: noting copy (*Stillingfleet*). 7. From: noting rescue (*Addison*). 8. Not in; noting exorbitance or irregularity (*Swift*). 9. From one thing to something different: *he went out of his regular course* (*Decay of Piety*). 10. To a different state from; in a different state: *my mouth is out of taste* (*Bacon*). 11. Not according to: *done out of rule* (*Pope*). 12. To a different state from: noting separation: *he is out of favour* (*Hooker*). 13. Beyond: out of *sight* (*Addison*). 14. Deviating from; noting irregularity (*Shakspeare*). 15. Past; without; noting something worn out or exhausted (*Knolles*). 16. By means of (*Shakspeare*). 17. In consequence of; noting the motive or reason: *he reproached me out of kindness* (*Bacon*). 18. *Out of hand*: immediately as that is easily used which is ready in the hand (*Shakspeare*).

To Out. *v. a.* To deprive by expulsion (*King Charles*).

Out, in composition, generally signifies something beyond or more than another; but sometimes it betokens emission, exclusion, or something external.

To OUTA'CT. *v. a.* (*out* and *act*.) To do beyond (*Otway*).

To OUTBA'LANCE. *v. a.* (*out* and *balance*.) To overweigh; to preponderate (*Dryden*).

To OUTBA'R. *v. a.* (*out* and *bar*.) To shut out by fortification (*Spenser*).

To OUTBI'D. *v. a* (*out* and *bid*.) To overpower by bidding a higher price (*Donne*).

OUTBI'DDER. *s.* One that outbids.

OUTBLO'WED. *a.* (*out* and *blow*.) Inflated; swollen with wind (*Dryden*).

OU'TBORN. *a.* (*out* and *born*.) Foreign; not native.

OU'TBOUND. *a.* (*out* and *bound*.) Destined to a distant voyage (*Dryden*).

To OUTBRA'VE. *v. a.* (*out* and *brave*.) To bear down and defeat by more daring, insolent, or splendid appearance (*Cowley*).

To OUTBRA'ZEN. *v. a.* (*out* and *brazen*.) To bear down with impudence.

OU'TBREAK. *s.* (*out* and *break*.) That which breaks forth: eruption (*Shakspeare*).

To OUTBREA'THE. *v. a.* (*out* and *breathe*.) 1. To weary by having better breath (*Shaks.*). 2. To expire (*Spenser*).

OU'TCAST. *part.* (*out* and *cast*.) 1. Thrown into the air as refuse (*Spenser*). 2. Banished; expelled (*Milton*).

Ou'tcast. *s.* Exile; one rejected; one expelled (*Prior*).

To OUTCRA'FT. *v. a.* (*out* and *craft*.) To excel in cunning (*Shakspeare*).

OU'TCRY. *s.* (*out* and *cry*.) 1. Cry of vehemence; cry of distress; clamour (*Denh.*). 2. Clamour of detestation (*South*). 3. A public sale; an auction (*Ainsworth*).

To OUTDA'RE. *v. a.* (*out* and *dare.*) To venture beyond (*Shakspeare*).

To OUTDA'TE. *v. a.* (*out* and *date.*) To antiquate (*Hammond*).

To OUTDO'. *v. a.* (*out* and *do.*) To excel; to surpass; to perform beyond another (*Milton*).

To OUTDWE'LL. *v. a.* (*out* and *dwell.*) To stay beyond (*Shakspeare*).

OU'TER. *a.* (from *out.*) That which is without: opposed to *inner* (*Grew*).

OU'TERLY. *ad.* Toward the outside (*Grew*).

OU'TERMOST. *a.* (superlative, from *outer.*) Remotest from the midst (*Boyle*).

To OUTFA'CE. *v. a.* (*out* and *face.*) 1. To brave; to bear down by show of magnanimity, or with impudence (*Wotton*). 2. To stare down (*Raleigh*).

To OUTFA'WN. *v. a.* (*out* and *fawn.*) To excel in fawning (*Hudibras*).

To OUTFLY'. *v. a.* (*out* and *fly.*) To leave behind in flight (*Shakspeare*).

OU'TFORM. *s.* (*out* and *form.*) External appearance (*Ben Jonson*).

To OUTFRO'WN. *v. a.* (*out* and *frown.*) To frown down; to overbear by frowns (*Shakspeare*).

OU'TGATE. *s.* (*out* and *gate.*) Outlet; passage outward (*Spenser*).

To OUTGI'VE. *v. a.* (*out* and *give.*) To surpass in giving (*Dryden*).

To OUTGO'. *v. a.* (*out* and *go.*) 1. To surpass; to excel (*Carew*). 2. To go beyond; to leave behind in going. 3. To circumvent; to overreach (*Denham*).

To OUTGRO'W. *v. a.* (*out* and *grow.*) To surpass in growth; to grow too great or too old for any thing (*Swift*).

OU'TGUARD. *s.* (*out* and *guard.*) One posted at a distance from the main body, as a defence (*Dryden*).

To OUTJE'ST. *v. a.* (*out* and *jest.*) To overpower by jesting (*Shakspeare*).

To OUTKNA'VE. *v. a.* (*out* and *knave.*) To surpass in knavery (*L'Estrange*).

OUTLA'NDISH. *a.* (*out* and *land.*) Not native; foreign (*Donne*).

To OUTLA'ST. *v. a.* (*out* and *last.*) To surpass in duration (*Waller*).

OU'TLAW. *s.* (utlaʒa, Saxon.) One excluded from the benefit of the law; a robber; a bandit (*Davies*).

To OU'TLAW. *v. a.* To deprive of the benefits and protection of the law (*Herbert*).

OUTLAWRY, is being put out of the law, or out of the king's protection. It is a punishment inflicted for a contempt in refusing to be amenable to the process of the higher courts. By outlawry in civil actions, a person is put out of the protection of the law, so that he is not only incapable of suing for the redress of injuries, but may be imprisoned, and forfeits all his goods and chattels, and the profits of his land; his personal chattels immediately upon the outlawry, and his chattels real, and the profits of his lands, when found by inquisition. 1 Salk. 395.

It seems that originally process of outlawry only lay in treason and felony, and was afterwards extended to trespass of an enormous nature; but the process of outlawry at this day lies in all appeals, and in all indictments of conspiracy and deceit, or other crimes of a higher nature than trespass vi et armis; but it lies not in an action, nor on an indictment on a statute, unless it is given by such statute either expressly, as in the case of a præmunire; or impliedly, as in cases made treason or felony by statute; or where a recovery is given by an action in which such process lay before, as in case of forcible entry. Staundf. 192.

Process of outlawry. The exigent must be sued in the county where the party really resides, for there all actions were originally laid; and because outlawries were at first only for treason, felony, or very enormous trespasses, the process was to be executed at the torn, which is the sheriff's criminal court; and this held not only before the sheriff, but before the coroners, who were ancient conservators of the peace, being the best men in each county, to preside with the sheriff in his court, and who pronounced the outlawry in the county-court on the parties being quinto exactus; and therefore anciently there was no occasion for any process to any other county than that in which the party actually resided. But the modern practice being different, the reader is referred to Tidd's Pract. K. B.

Of the reversal of outlawries. There are two ways of reversing an outlawry: first, by a writ of error returnable coram nobis; secondly, by motion founded on a plea, averment, or suggestion of some matter apparent; as in respect of a supersedeas, omission of process, variance, or other matter apparent on the record.

To OUTLE'AP. *v. a.* (*out* and *leap.*) To pass by leaping; to start beyond.

OU'TLEAP. *s.* Sally; flight; escape (*Locke*).

OU'TLET. *s.* (*out* and *let.*) Passage outward; discharge outward; passage of egress (*Ray*).

OUTLICKER, in a ship, a small piece of timber made fast to the top of the poop, and standing out right astern. At the outmost end thereof is a hole, into which the standing part of the sheet is reeved.

OU'TLINE. *s.* (*out* and *line.*) Contour; line by which any figure is defined; extremity.

To OUTLI'VE. *v. a.* (*out* and *live.*) To live beyond; to survive (*Clarendon*).

OU'TLIVER. *s.* A survivor.

To OUTLO'OK. *v. a.* (*out* and *look.*) To face down; to browbeat (*Shakspeare*).

To OUTLU'STRE. *v. a.* (*out* and *lustre.*) To excel in brightness (*Shakspeare*).

OUTLY'ING. *part. a.* (*out* and *lie.*) Not in the common course of order (*Temple*).

To OUTMA'RCH. *v. a.* (*out* and *march.*) To leave behind in the march (*Clarendon*).

To OUTME'ASURE. *v. a.* (*out* and *measure.*) To exceed in measure (*Brown*).

OU'TMOST. *a.* (*out* and *most.*) Remotest from the middle (*Newton*).

To OUTNU'MBER. *v. a.* (*out* and *number.*) To exceed in number (*Addison*).

To OUTPA'CE. *v. a.* (*out* and *pace.*) To outgo; to leave behind (*Chapman*).

OU'TPARISH. *s.* (*out* and *parish.*) Parish not lying within the walls (*Graunt*).

OU'TPART. *s.* (*out* and *part.*) Part remote from the centre or main body (*Ayliffe*).

OUTPOSTS, in a military sense, a body of men posted beyond the grand guard; to whom the name outposts is given, as being the bounds or limits of the camp.

To OUTPOU'R. *v. a.* (*out* and *pour.*) To emit; to send forth in a stream (*Milton*).

To OUTPRI'ZE. *v. a.* (*out* and *prize.*) To exceed in the value set upon it (*Shakspeare*).

To OU'TRAGE. *v. a.* (*outrager*, Fr.) To injure violently or contumeliously; to insult roughly and tumultuously (*Atterbury*).

To OU'TRAGE. *v. n.* To commit exorbitancies: not in use (*Ascham*).

OU'TRAGE. *s.* (*outrage*, French.) Open violence; tumultuous mischief (*Shakspeare*).

OUTRA'GIOUS. *a.* (*outrageux*, French.) 1. Violent; furious; raging; exorbitant; tumultuous; turbulent (*Sidney*). 2. Excessive; passing reason or decency (*Dryden*). 3. Enormous; atrocious (*Shakspeare*).

OUTRA'GIOUSLY. *ad.* Violently; tumultuously; furiously (*South*).

OUTRA'GIOUSNESS. *s.* (from *outragious*) Fury; violence (*Dryden*).

To OUTREA'CH. *v. a.* (*out* and *reach.*) To go beyond (*Brown*).

To OUTRI'DE. *v. a.* (*out* and *ride.*) To pass by riding (*Dryden*).

OUTRI'GHT. *ad.* (*out* and *right.*) 1. Immediately; without delay (*Arbuthnot*). 2. Completely (*Addison*).

To OUTRO'AR. *v. a.* (*out* and *roar.*) To exceed in roaring (*Shakspeare*).

OU'TRODE. *s.* (*out* and *rode.*) Excursion.

To OUTRO'OT. *v. a.* (*out* and *root.*) To extirpate; to eradicate (*Rowe*).

To OUTRU'N. *v. a.* (*out* and *run.*) 1. To leave behind in running (*Shakspeare*). 2. To exceed (*Addison*).

To OUTSA'IL. *v. a.* (*out* and *sail.*) To leave behind in sailing (*Broome*).

To OUTSCO'RN. *v. a.* (*out* and *scorn.*) To bear down or confront by contempt (*Shaksp.*).

To OUTSE'L. *v. a.* (*out* and *sell.*) 1. To exceed in the price for which a thing is sold (*Temple*). 2. To gain a higher price (*Shaks.*).

To OUTSHI'NE. *v. a.* (*out* and *shine.*) 1. To emit lustre (*Shakspeare*). 2. To excel in lustre (*Denham*).

To OUTSHO'OT. *v. a.* (*out* and *shoot.*) 1. To exceed in shooting (*Dryden*). 2. To shoot beyond (*Norris*).

OU'TSIDE. *s.* (*out* and *side.*) 1. Superficies; surface; external part (*L'Estr.*). 2. Extreme part; part remote from the middle (*Ba.*). 3. Superficial appearance (*Locke*). 4. The utmost (*Mortimer*). 5. Person; external man (*Bacon*). 6. Outer side; part not inclosed (*Spectator*).

To OUTSI'T. *v. a.* (*out* and *sit.*) To sit beyond the time of any thing (*South*).

To OUTSLE'EP. *v. a.* (*out* and *sleep.*) To sleep beyond (*Shakspeare*).

To OUTSPE'AK. *v. a.* (*out* and *speak.*) To speak something beyond; to exceed (*Shaks.*).

To OUTSPO'RT. *v. a.* (*out* and *sport.*) To sport beyond (*Shakspeare*).

To OUTSPRE'AD. *v. a.* (*out* and *spread.*) To extend; to diffuse (*Pope*).

To OUTSTA'ND. *v. n.* (*out* and *stand.*) 1. To support; to resist (*Woodward*). 2. To stand beyond the proper time (*Shakspeare*).

To OUTSTA'ND. *v. a.* To protuberate from the main body.

To OUTSTA'RE. *v. a.* (*out* and *stare.*) To face down; to browbeat; to outface with effrontery (*Crashaw*).

OU'TSTREET. *s.* (*out* and *street.*) Street in the extremities of a town.

To OUTSTRETCH. *v. a.* (*out* and *stretch.*) To extend; to spread out (*Shakspeare*).

To OUTSTRI'P. *v. a.* To outgo; to leave behind in a race (*Ben Jonson*).

To OUTSWE'ETEN. *v. a.* (*out* and *sweeten.*) To excel in sweetness (*Shakspeare*).

To OUTSWE'AR. *v. a.* (*out* and *swear.*) To overpower by swearing (*Shakspeare*).

To OUTTO'NGUE. *v. a.* (*out* and *tongue.*) To bear down by noise (*Shakspeare*).

To OUTTA'LK. *v. a.* (*out* and *talk.*) To overpower by talk (*Shakspeare*).

To OUTVA'LUE. *v. a.* (*out* and *value.*) To transcend in price (*Boyle*).

To OUTVE'NOM. *v. a.* (*out* and *venom.*) To exceed in poison (*Shakspeare*).

To OUTVI'E. *v. a.* (*out* and *vie.*) To exceed; to surpass (*Addison*).

To OUTVI'LLAIN. *v. a.* (*out* and *villain.*) To exceed in villany (*Shakspeare*).

To OUTVO'ICE. *v. a.* (*out* and *voice.*) To outroar; to exceed in clamour (*Shakspeare*).

To OUTVO'TE. *v. a.* (*out* and *vote.*) To conquer by plurality of suffrages (*South*).

To OUTWA'LK. *v. a.* (*out* and *walk.*) To leave one in walking.

OUTWALL. *s.* (*out* and *wall.*) 1. Outward part of a building. 2. Superficial appearance (*Shakspeare*).

OU'TWARD. *a.* (utpeapd, Saxon.) 1. External; opposed to inward (*Shakspeare*). 2. Extrinsic; adventitious (*Dryden*). 3. Foreign; not intestine (*Hayward*). 4. Tending to the outparts (*Dryden*). 5. (In theology.) Carnal; corporeal; not spiritual (*Duppa*).

OU'TWARD. *s.* External form (*Shaksp.*).

OU'TWARD or OUTWARDS. *ad.* 1. To foreign parts; as, a ship outward bound. 2. To the outer parts (*Newton*).

OU'TWARDLY. *ad.* (from *outward.*) 1. Externally, opposed to inwardly (*Hooker*). 2. In appearance; not sincerely (*Sprat*).

To OUTWE'AR. *v. a.* (*out* and *wear.*) 1. To pass tediously (*Pope*). 2. To last longer than something else.

To OUTWE'ED. *v. a.* (*out* and *weed.*) To extirpate as a weed (*Spenser*).

To OUTWEIGH. *v. a.* (*out* and *weigh.*) 1. To exceed in gravity (*Wilkins*). 2. To preponderate; to excel in value or influence (*Dryden*).

To OUTWELL. *v. a.* (*out* and *well.*) To pour out; not in use (*Spenser*).

To OUTWIT. *v. a.* (*out* and *wit.*) To cheat; to overcome by stratagem (*L'Estrange*).

OUTWORK. *s.* (*out* and *work.*) The parts of a fortification next the enemy. (See FORTIFICATION).

OUTWORN. *part.* (from *outwear.*) Consumed or destroyed by use (*Milton*).

To OUTWREST. *v. a.* (*out* and *wrest.*) To extort by violence (*Spenser*).

OUTWROUGHT. *part.* (*out* and *wrought.*) Outdone; exceeded in efficacy (*Ben Jonson*).

To OUTWORTH. *v. a.* (*out* and *worth.*) To excel in value (*Shakspeare*).

OWAIN, or OWEN TUDOR, married Catherine, the widow of Henry V. in 1426, and was father by her of three sons, the eldest of whom embraced the monastic life; the second was Edmund, earl of Richmond, father to Henry VII. and the third Jasper, earl of Pembroke.

OWAIN GLANDWR, or OWEN GLENDOWER, last of the Welch princes, was in the service of Richard II. but was disgraced by Henry IV. In consequence he took up arms, burnt Ruthyn, and defeated lord Grey, who had obtained his lands from the king; but afterwards he restored him to liberty for a large ransom. He in 1402 routed Edward Mortimer in Radnorshire, and caused himself to be proclaimed sovereign of Wales. Though assisted by the French, his affairs became desperate, and unable to withstand the English, he led a life of retirement, and died in 1415, disguised as a poor shepherd.

To OWE. *v. a.* (*eg*, *aa*, Islandic.) 1. To be obliged to pay; to be indebted (*Shakspeare*). 2. To be obliged to ascribe; to be obliged for (*Milton*). 3. To have from any thing as the consequence of a cause (*Pope*). 4. To possess; to be the right owner of (*Shakspeare*).

OWEN (John), an excellent epigrammatist, was born in Caernarvonshire, and bred at Winchester school, and thence elected a scholar of New College, Oxford, where he took his degree of LL.B. and then became schoolmaster at Trylegh in Monmouthshire. Afterwards he became master of the free school at Warwick. He died poor in 1622, and was buried in St. Paul's cathedral. His Latin epigrams in 1 vol. 8vo. were well received both at home and in foreign countries. Many of them have been translated by different authors.

OWEN (John), a learned divine among the independents, was born at Hadham in Oxfordshire in 1616, and educated at Queen's college, where he took his degrees in arts, and then entered into orders. In the civil wars he joined the puritans, and became so zealous in the service of the parliament, that he was presented to a living in Essex. He afterwards quitted the presbyterian way, which he had hitherto followed, and formed an independent congregation at Coggeshall. He was often called upon to preach before the parliament, and did so the very day after the murder of Charles I: but then it must be confessed his sermon on that occasion was void of offence. Cromwell was so well pleased with his pulpit abilities, that he took him over to Ireland as his chaplain; but he returned soon after, and by order of parliament was promoted to the deanery of Christ Church, Oxford, of which university, in 1652, he was appointed vice chancellor. The year following he took his degree of D.D. He was very tolerant to the royalists at Oxford, and even allowed them to use the liturgy of the church of England. At the restoration he was ejected from the deanery, on which he retired to an estate which he had purchased in Essex. He died at Ealing in 1683. Dr. Owen was a very voluminous writer. His exposition of the Epistle to the Hebrews is the best of his performances.

OWEN (Henry), a learned divine, was born in Monmouthshire, and educated first at Ruthin school, and next at Jesus college, Oxford, where he took his degree of M.D. but afterwards entered into orders, and obtained the vicarage of Edmonton in Middlesex, and St. Olavis, Hart-street, London. He died in 1795, aged 80. His works are, 1. Observations on the Scripture Miracles; 2. Remarks on the four Gospels; 3. An Enquiry into the Septuagint Version; 4. Sermons preached at Boyle's Lecture, 2 vols.; 5. An Introduction to Hebrew Criticism; 6. The Modes of Quotation used by the Evangelical Writers explained and vindicated; 7. Posthumous Sermons, 2 vols.

OWEN (George), an English physician, who was educated at Oxford, and became fellow of Merton college in 1519. He was appointed physician to Henry VIII. who left him in his will 100*l.* He served also Edward VI. and queen Mary; the former of whom he brought into the world by the Cæsarean method. He died in 1558. He wrote, A meet Diet for the new Ague, 1558, folio.

OWEN (Charles), a native of Montgomery. He was ordained minister of a dissenting congregation at Bridgenorth, in Shropshire, which place he was forced to leave, till king James published his declaration granting liberty of conscience. He died in 1712, aged 58. Mr. Owen wrote several pieces in defence of the nonconformists.

OWHYHEE, the largest and most eastern of the Sandwich islands, in the Pacific ocean. Its length from N. to S. is 84 miles, and its breadth 70. It is divided into six districts, two of which, on the N.E. side, are separated by a mountain, that rises in three peaks, perpetually covered with snow, and may be seen at 40 leagues distance. To the N. of this mountain the coast consists of high and abrupt cliffs, down which fall many beautiful cascades; and the whole country is covered with cocoa-nut and bread-fruit trees. The peaks of

the mountain on the N.E. side appear to be about half a mile high. To the S. of this mountain the ground is covered with cinders, and in many places has black streaks, which seem to mark the course of a lava that has flowed from the mountain to the shore. The southern promontory looks like the mere dregs of a volcano. The projecting headland is composed of broken and craggy rocks piled irregularly on one another, and terminating in sharp points; yet, amid these ruins, are many patches of rich soil, carefully laid out in plantations. The fields are inclosed by stone fences, and are interspersed with groves of cocoa-nut trees. Here captain Cook, in 1779, fell a victim to a sudden resentment of the natives, with whom he unfortunately had a dispute. Lon. 156 0 W. Lat. 19. 28 N.

OWING. *part.* (from *owe*) 1. Consequential (*Atterbury*). 2. Due as a debt (*Locke*). 3. Imputable to, as an agent (*Swift*).

OWL, in ornithology. See STRIX.

OWLER, one who carries contraband goods.

OWLING, so called from its being usually carried on in the night, is the offence of transporting wool or sheep out of this kingdom, to the detriment of its staple manufacture. This was forbidden at common law, and more particularly by statute 11 Edw. III. c. 1. when the importance of our woollen manufacture was first attended to; and there are now many later statutes relating to this offence, the most useful and principal of which are those enacted in the reign of queen Elizabeth, and since. The statute 8 Eliz. c. 3. makes the transportation of live sheep, or embarking them on board any ship, for the first offence, forfeiture of goods, and imprisonment for a year, and that at the end of the year the left hand shall be cut off in some public market, and shall be there nailed up in the openest place; and the second offence is felony.

The statutes 12 Car. II. c. 32. and 7 and 8 Will. III. c 28 make the exportation of wool, sheep, or fuller's earth, liable to pecuniary penalties, and the forfeiture of the interest of the ship and cargo by the owners, if privy; and confiscation of goods, and three years imprisonment to the master and all the mariners. And the statute 4 Geo. I. c. 11 (amended and farther enforced by 12 Geo. II. c. 21. and 19 Geo. II. c. 34), makes it transportation for seven years, if the penalties be not paid

OWN. *s.* (agen, Saxon.) 1 This is a word of no other use than as it is added to the possessive pronouns, my, thy, his, our, your, their (*Dryden*). 2. It is added generally by way of emphasis or corroboration (*Dryden*). 3. Sometimes it is added to note opposition or contradistinction; domestic; not foreign; mine, his, or yours; not another's (*Daniel*).

To OWN. *v. a* (from the noun.) 1. To acknowledge; to avow for one's own (*Dryden*). 2. To possess; to claim (*Dryden*). 3. To avow (*Dryden*). 4. To confess; not to deny (*Tillotson*).

OWNER. *s.* (from *own.*) One to whom any thing belongs; master (*Shakspeare*).

OWNERSHIP. *s.* (from *owner.*) Property; rightful possession (*Ayliffe*).

OX, in mastiology. See BOS.

OXACANTHA. See BERBERIS.

OXALATS. Salts formed by an union of the oxalic acid with alkalies, earths, or metallic oxyds, as nitrats, as salts formed by an union of the nitric acid with the same bodies.

This genus of salts was first made known by Bergman, who described the greater number of them in his Dissertation on Oxalic Acid, published in 1776. These salts may be distinguished by the following properties: 1. When exposed to a red heat their acid is decomposed and driven off, and the base only remains behind. 2. Lime-water precipitates a white powder from their solutions, provided no excess of acid is present. This powder is soluble in acetic acid, after being exposed to a red heat. 3. The earthy oxalats are in general nearly insoluble in water: the alkaline oxalats are capable of combining with an excess of acid, and forming superoxalats much less soluble than the oxalats. 4. The insoluble oxalats are rendered easily soluble by an excess of the more powerful acids.

There are but a few of these salts of much importance, although the oxalic acid combines with most of the metallic oxyds, and with all the alkalies and earths. Like the tartareous acid it unites with the alkalies in two different proportions, in each of which it forms crystallizable salts. One of these states is with the acid in excess, forming therefore salts known by the general term of acidula; the other is when the two ingredients are in perfect saturation. Of these the acidulous oxalat of pot-ash, or, according to Dr. Thomson's useful nomenclature, the superoxalat of pot-ash, has been examined with the greatest care.

This is commonly known by the name of salt of sorrel, and as a very useful preparation we shall notice it at some length. It is prepared from the juice of the sorrel plant in various parts of Germany and Switzerland; and the method of making it, as laid down by Savary, Cartheuser, Weigleb, and others, is very simple. Large quantities of the plant are collected and exposed to considerable pressure in a mill, and may be to pressure in any other way; and the turbid juice thus expressed is allowed to stand for some days till much of the feculence has subsided. The clear liquor is then evaporated to one half, and set by in a cool place, and after some days a quantity of small-grained crystals are deposited. These are removed, and the liquor still farther evaporated, by which a second crop of crystals is collected; and sometimes a third or a fourth is gotten by a repetition of the process. The crystals are at first very mucilaginous and impure, but by resolution and re-evaporation they become clear, and then appear in the form of small white needles, in which state they are sold at a high price under the name of essential salt of lemons for taking out iron-moulds from linen; and

this state are also sometimes used for medicinal purposes. According to Savary 50 lbs. of the fresh plant yields about 25 lbs. of juice, from which 2¼ oz. of the essential salt may be extracted. Cartheuser appears to have obtained much more: 1 lb. of the plant having, according to him, given 1½ dram, which would be in the proportion of 9⅜ oz. from 50 lbs. of the plants; but probably this was less pure.

The taste of this oxalat is very sour, setting the teeth on edge; but his nothing bitter or unpleasant. The salt is hard and brittle, and decrepitates in the fire. It is very commonly adulterated by sulphat of pot-ash. Scheele first discovered the true composition of this salt, and showed it to be composed of pot-ash with an excess of acid, which by every test was identical with the acid of sugar, which had lately been discovered by Bergman. The same salt or oxalic acidulum may also be produced, as has been sufficiently proved by Scheele, by adding pure oxalic acid to nitre; the affinity of this acid to that portion of potash necessary to form the acidulum being greater than that of the nitric acid for potash. In the same manner the oxalic acid will partially decompose many other of the salts with pot-ash, such as the muriat, acetite, &c. In these cases the superoxalat of the pot-ash being much less soluble than the other salt, precipitates in small-needled crystals.

Besides the simple salts formed by the oxalic acid and the alkalies, several triple salts, most of them crystallizable, may be formed by saturating the superoxalat of one alkali by a different one. Thus if the superoxalat of pot-ash is saturated with soda, a triple neutral salt is obtained, consisting of oxalic acid, pot-ash, and soda. In like manner ammonia readily combines with the superoxalat of pot-ash and soda. In this, as in other respects, the habitudes of this acid strongly resemble those of the tartareous acid. The oxalats which have hitherto been observed are as follows:

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Oxalat of alumine.
Metallic oxalats.
Oxalat of silver.
Oxalat of mercury.
Oxalat of lead.
Oxalat of copper.
Oxalat of iron.

Most of the other metals (gold and platina excepted) are soluble in this acid, forming salts generally of little solubility, except with an excess of acid. The superoxalat of pot-ash also acts upon iron, copper, and several other metals; and these solutions retain the pot-ash belonging to the acidulum, and crystallize with it into triple salts that deserve further examination.

OXALIC ACID. (Sauerkleesause, Germ.) In chemistry, an acid found frequently in various acid vegetable juices, and rather plentifully in the oxalis acetocella, or wood-sorrel, and in other plants of the same genus; it is naturally united with a quantity of potash, not sufficient for complete saturation, forming what has been long known under the name of essential salt of sorrel.

The oxalic acid is prepared artificially by boiling a sufficient quantity of nitric acid with a variety of vegetable and animal substances, such as sugar, mucilage, alcohol, animal jelly, &c. Take sugar as an example: one ounce in powder is put into a retort, with three ounces of strong nitric acid. During the solution, great quantities of the nitrous acid escapes: heat is to be applied till the nitrous gass is driven off. Three ounces more of nitric acid are to be added, and the boiling continued till the fumes cease, and the colour of the liquor vanishes. Pour out the liquor into a wide shallow vessel, and, when it cools, crystals will be formed, which may be collected and dried on unsized paper. The crystals thus obtained may be again dissolved in distilled water, and evaporated to obtain new crystals. In this way oxalic acid may be obtained from the substances above enumerated, and many others, as alcohol, gum, honey, &c. Prepared in this way, oxalic acid is in a concrete state, crystallized in four-sided prisms, terminated in two-sided summits. They are white and transparent, and have considerable lustre. They have a sharp taste, and change vegetable blues into a red colour, and produce the same effect on all vegetables, excepting indigo.

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The crystals of oxalic acid are soluble in their own weight of boiling water. Water at the temperament of 65.7° dissolves half its weight of them. The specific gravity of the solution is 1.0593. One hundred parts of boiling alcohol dissolve 56 parts of these crystals; but at a mean temperature only 40 parts. Liquid oxalic acid has a very acrid taste when it is concentrated, but a very agreeable acid taste when sufficiently diluted with water.

It changes all vegetable blues, except indigo, to a red. One grain of crystallized acid, dissolved in 1920 grains of water, reddens the blue paper in which sugar-loaves are wrapt: one grain of it, dissolved in 3600 grains of water, reddens paper stained with turnsole. According to Morveau, one part of the crystalline acid is sufficient to communicate a sensible acidity to 2633 parts of water.

Its fixity is such, that none of it is sublimed when water containing it in solution is raised to the boiling temperature.

Oxalic acid is not affected by exposure to the air, or to the action of oxygen gass. The effect of the simple combustibles on it has not been tried.

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The oxalic acid is not often found native to any considerable extent, but is readily produced, as we have already seen, by the action of nitrous acid on almost every soluble vegetable matter, and most animal matters. During this action the nitric acid is obviously decomposed, and much nitrous gass given out; and hence the product must contain much of the oxygen which the nitrous acid parts with. But it appears that the formation of oxalic acid is not in any case a simple oxygenation of carbon and hydrogen, but a much more complicated operation; in which, according to well-established laws of affinity, specific proportions of carbon and hydrogen unite with a certain portion of oxygen to form oxalic acid, whilst at the same time other proportions of the same bases form different products. Hence it is inaccurate to state, as is sometimes done, that sugar is the base of the oxalic or saccharine acid, since it is a compound of hydrogen and carbon derived from the sugar, and which the action of the nitric acid causes to be separated in the proportions necessary for that purpose. Hence the utmost action of the nitric acid on oxalic acid differs from that which it exerts on sugar; for, in the former case, only carbonic acid and water are formed, while in the latter there is generated a quantity of acetous acid.

It is hence not to be wondered at that various other substances, containing the same radicals as sugar, should when treated with nitric acid be found to produce oxalic acid likewise. Thus the malic acid, which is produced along with the oxalic acid, in almost every instance, is to a great extent, though not altogether, converted into oxalic acid, by the further action of nitric acid: and hence it is, in some sense, an intermediate state between oxalic acid and the hydro-carbonous base previous to oxygenation: as is sufficiently shown by many experiments of Scheele.

So gum-arabic treated with nitric acid was found by the same excellent chemist to yield a mixture of malic and oxalic acid. Manna, sugar of milk, salep, aloe, colocynth, and some of the resinous gums, produced the same result, but in a smaller quantity: of the essential oils, only that of parsley could be made to furnish these acids, which it did in abundance, and was totally resolved into them.

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E. Leaves ternate; peduncle one-flowered; stem naked towards the bottom.

F. Leaves ternate; peduncles one-flowered; stem leafy.

G. Leaves ternate; peduncles more than one-flowered, with a stem.

H. Leaves in finger-like directions.

I. Leaves pinnate.

The species chiefly cultivated are the following.

1. O. acetosella. Common wood-sorrel.
2. O. striata. Upright wood-sorrel.
3. O. caprina. Goat's-foot wood-sorrel.
4. O. versicolor. Stripe-flowered wood-sorrel.
5. O. purpurea. Purple wood-sorrel.
6. O. incarnata. Flesh-coloured wood-sorrel.

The first sort may be readily increased by planting the divided roots in a moist shady border in the early part of spring. The leaves arise immediately from the roots upon single long footstalks, and are composed of three heart-shaped lobes. They are gratefully acid, and of use in scorbutic and other putrid disorders. The juice is now crystallised, and constitutes a very convenient and elegant substitute for lemon juice. See OXALIC ACID.

The other sorts, which are all bulbous-rooted, may be increased by planting offsets from the bulbs that issue from the sides of the stems, in pots filled with good light mould. They require protection in the winter season.

OX DAISY. In botany. See CHRYSANTHEMUM.

OX EYE. See BAPHTHALMUM.

OXFORD, the capital of Oxfordshire, and a bishop's see, with a market on Wednesday and Saturday. It is seated at the conflux of the Cherwell with the Thames, and has a canal to Braunston, in Northamptonshire. The city, with the suburbs, is of a circular form, three miles in circumference, and was anciently surrounded by walls, of which considerable remains are yet to be seen; as also of its extensive castle, the tower of which now serves for a county gaol. In 1801 the number of inhabitants was 12,107. The origin of the university is involved in great obscurity. According to Camden, even in the times of the Britons, Oxford was the seat of learning. Some students removing hither from Cricklade, a monastery was founded by St. Frideswide, in the time of the Saxons, which was burned, and rebuilt by king Ethelred. When the Danes were reduced by Alfred, that prince is said to have founded three colleges, one for philosophy, another for grammar, and a third for divinity, in the year 886, so that on this consideration Alfred seems rather the restorer than the founder. But however that may be, Mr. Camden himself gives the precedence in point of time to Baliol college, in the year 1269, by which is probably understood to mean first endowed with a regular and permanent [illegible]ge. The university is governed by a [illegible]cellor, now lord Grenville, chosen by the students for life; a high steward, named by the chancellor, and approved by the university, who is also for life, and to assist the chancellor, &c. a vice-chancellor, one always in orders, and the head of a college, who exercises the chancellor's power, keeps the officers and students to their duty, and chooses four pro-vice-chancellors, out of the heads of colleges, to officiate in his absence; two proctors, who are masters of arts, chosen yearly out of the several colleges in turn, to keep the peace, punish disorders, oversee weights and measures, order scholastic exercises, and the admission to degrees; a public orator, who writes letters by order of convocation, and harangues princes, and other great men, who visit the university; a keeper of its archives; a register, who records all transactions of the convocation, &c.; three esquire-beadles, with gilt silver maces, and three yeomen-beadles; with plain ones, who attend the vice-chancellor in public, execute his orders for apprehending delinquents, publish the courts of convocation, and conduct the preachers to church, and lecturers to school; a verger, who, on solemn occasions, walks with the beadles before the vice-chancellor, and carries a silver rod. Oxford contains twenty colleges, and five halls. 1. Baliol College, founded in the year 1262, by John Baliol, father of John Baliol, king of Scotland, in great part rebuilt in the reigns of Henry VI and VII; it consists of a master, twelve fellows, fourteen scholars, and eighteen exhibitioners. 2. Merton College. Walter de Merton, bishop of Rochester and lord chancellor of England, transferred to Oxford, in the year 1267, a college which he had built at Maldon, in Surry, three years before. At first he seems to have only intended this for such of chaplains and scholars as should choose to come hither from the other; but in 1274 both were united by the founder. It consists of a warden, twenty-four fellows, fourteen post-masters, &c. 3. University College. The largest of Alfred's three halls before mentioned, is by some supposed to have been University College. But however that be, it is more certain that the restoration of this old house is owing to the legacy of William, archdeacon of Durham, who died in the year 1249, and left 310 marks to the chancellor and university, for the maintenance of eleven or twelve masters, wherewith a society was established in the year 1260, and their statutes settled by the university, in the year 1292, and the endowment of Walter Skerlaw, bishop of Durham, Henry Percy, earl of Northumberland, and other benefactors. It was valued at 78l. per annum, and consists now of a master, twelve fellows, thirteen scholars, &c. This college has been much enlarged by the generous benefaction of Dr. John Radcliff, who left 5000l. for building the master's lodge, and chambers for two new fellows, by him instituted for the study of physic, with a handsome salary for ten years, half of which time at least they are to travel beyond the seas for their better improvement, as his will expresses

it. 4. Exeter College, founded by William Stapleton, bishop of Exeter, in the year 1314. It consisted at first of only thirteen fellows or scholars, of whom twelve were to be born within the diocese of Exeter. Its revenues were valued, 26th Henry VIII, at 81l. It has now a rector, twenty-two fellows, &c. 5. Oriel College, founded in the year 1324, by Adam de Bromé, almoner to Edward II. Edward III gave a tenement called Le Oriele, whence probably the name. It now maintains a provost, eighteen fellows, and fourteen exhibitioners. 6. Queen's College, the foundation of which was ascribed to queen Philippa, but is really due to her chaplain, Robert de Eglesfield, rector of Burg on Stanmore, in the year 1340, for a provost, twelve fellows, and seventy scholars. It now consists of a provost, twenty-two fellows, &c. 7. New College or Winchester College, or as it should seem St. Mary's College, of Winchester, in Oxford, was founded by the great William Wykeham, in the year 1379, with endowment for a warden and seventy fellows, &c. The excellent body of statutes which the founder himself drew up has been considered as the most judicious and complete, and has been followed by most succeeding founders of colleges. 8. Trinity College. Richard Horton, prior, and the monks at Durham, purchased ground, in the year 1290, for a college here, which was afterwards increased and farther endowed by Richard de Bury, the learned bishop of that see. At the dissolution, this college was sequestered, and by Edward VI sold to Dr. Owen, a physician; and afterwards came into the possession of sir Thomas Pope who, on its site founded Trinity College, for a president, twelve fellows, and twelve scholars. Dr. Ralph Bathurst, president, adorned it with new buildings, and a beautiful chapel consecrated in the year 1694, and was otherwise an eminent benefactor. 9. Lincoln College. Richard Fleming, bishop of Lincoln, obtained licence of Henry VI, in the year 1427, to make All-saints' Church collegiate, and to found a college for a rector, and seven scholars; finished and endowed in the year 1475, by Thomas Rotherham, bishop of Lincoln, and archbishop of York: now consists of a rector, twelve fellows, &c. 10. Worcester College was founded, in the year 1714, by the benefaction of sir Thomas Cookes, of Bentley, in Worcestershire, for one provost, six fellows, and six scholars. To these have since been added two fellowships, and two scholarships, by Dr. Finney; and two exhibitions for Charterhouse scholars, by lady Holford. But the principal benefactors have been Mrs. Eaton, daughter of Dr. Eaton, principal of Gloucester hall, who founded six fellowships in the year 1735: and Dr. Clarke, fellow of All Souls' College, who gave six fellowships, and three scholarships, in the year 1736, besides other considerable bequests. This house was originally called Gloucester College, being a seminary for educating the novices of Gloucester monastery, as it was likewise for those of other religious houses. It was founded, in the year 1283, by John Giffard, baron of Brimsfield. When suppressed at the reformation, it was converted into a palace for the bishop of Oxford; but was soon afterwards erected into an academical hall, by sir Thomas White, the founder of St. John's College, in which state it continued, till it at length received a charter of incorporation, and a small endowment from sir Thomas Cookes. Here are one provost, twenty fellows, seventeen scholars, &c. the whole number about forty. 11. St. John's College. This college was founded in the year 1557, by sir Thomas White, alderman and merchant taylor of London, for the maintenance of one president, fifty fellows, three chaplains, three clerks, and six choristers, &c. This college was founded on the site of Bernard's College, erected in the year 1437, by archbishop Chichely. Archbishop Laud and bishop Juxon were liberal benefactors to this college. 12. All Souls' College, founded in the year 1438, by Henry Chichely, archbishop of Canterbury, for a warden, and forty fellows, besides two chaplains, nine clerks, and choristers. 13. Magdalen College, founded in the year 1458, by William Patten, alias Wainfleet, bishop of Winchester, for a president, forty fellows, thirty scholars or demies, a divinity lecturer, a school-master, four chaplains, &c. 14. Brazen Nose College. This college was founded in the year, 1509 by Richard Smith, bishop of Lincoln, and Richard Sutton, of Presbury in Cheshire, knight, for the maintenance of one principal, and fifteen fellows. To this number succeeding benefactions have added five fellows, thirty-two scholars, and four exhibitions. 15. Corpus Christi College. This college was founded, in the year 1516, by Richard Fox, who was successively bishop of Exeter, Bath and Wells, Durham and Winchester; and lord privy seal to king Henry VII and VIII, for the maintenance of one president, twenty fellows, twenty scholars, &c. 16. Christ Church, originally founded by cardinal Wolsey, in the year 1525, for the support of a dean, a sub-dean, 100 canons, &c. But while the cardinal was completing this design, having actually admitted eighteen canons, about the year 1529, he fell into disgrace; when king Henry VIII seized upon the foundation, which he suspended till the year 1532, and then re-established it under the name of Henry the Eighth's College, for one dean, and twelve canons. This foundation, however, the same king suppressed in the year 1545. But the next year he removed hither the episcopal see, first established in Oseney Abby, a dissolved Augustine monastery, near the suburbs of Oxford, in the year 1542. At the same time, on part of Wolsey's original revenue, he constituted a dean, eight canons, eight chaplains, eight clerks, eight choristers, and an organist; together with sixty students, and forty grammar scholars, a schoolmaster and usher. In this form the foundation has remained ever since; except, that queen Elizabeth, in the year 1561, converted the forty

grammar-scholars into academical students; ordering, at the same time, that their vacancies should be supplied from Westminster school. Thus, 100 students were established, to which number William Thurstone, esquire, in the year 1663, added one. 17. Jesus College, founded in the year 1571, by queen Elizabeth, and endowed by Hugh Price, LL.D. a native of the county of Brecknock, and treasurer of St. David's, for a principal, eight fellows, and eight scholars; by other benefactors raised to nineteen fellows, and eighteen scholars, with many exhibitioners. 18. Wadham College. This college was designed by Nicholas Wadham, esquire, of Merifield in Somersetshire, and executed in pursuance of his last will, by Dorothy, his widow, in the year 1613, for the maintenance of one warden, fifteen fellows, fifteen scholars, two chaplains, and two clerks. The statutes direct, that the warden shall quit the college in case of marriage; that the fellows shall enjoy the benefit of the society no longer than eighteen years after their regency in arts. 19. Pembroke College. This college was founded in the year 1620, by the joint benefaction of Thomas Tesdale, of Glympton, in Oxfordshire, and Richard Wightwick, S.T.B. rector of Ilsley, Berks; for one master, ten fellows, and ten scholars. The society has since been much enlarged by the addition of several fellowships, scholarships, and exhibitions. This college was originally Broadgate Hall, famous for the study of the civil law, a flourishing house of learning, in which, to mention no more, Camden received part of his education. It obtained the name of Pembroke College, from the memorable earl of Pembroke, who was chancellor of the university when the college was founded, and whose interest was particularly instrumental in its establishment. 20. Hertford College, formerly called Hartford or Hart Hall, founded by Walter Stapleton, bishop of Exeter, in the year 1312, and belonged to Exeter College. Having received a charter of incorporation from Dr. Richard Newton, a late learned and public spirited principal, who has also consigned an estate towards its endowment, this ancient hotel was converted into a college, September 8, 1740. The foundation consists of a principal, four senior fellows or tutors, and junior fellows or assistants, beside a certain number of students or scholars. Of the numerous halls, hotels, or inns, which were the only academical houses originally possessed by the students of Oxford, only five subsist at present. These societies are neither endowed nor incorporated. They are subject to their respective principals, whose salary arises from the room-rent of the house. The principals are appointed by the chancellor of the university; that of Edmond Hall excepted, who is nominated by Queen's College, under whose patronage Edmond Hall still remains. The rest were formerly dependent on particular colleges. 1. Alban Hall. This hall is contiguous to Merton College, on the east. It appears to have been a house of learning in the reign of Edward I, and received its name from Robert de St. Alban, a citizen of Oxford; who, in the reign of Henry III, conveyed this tenement to the nuns of Littlemore. 2. St. Edmund's Hall. This hall is situated to the east of Queen's College. It was first established about the reign of Edward III, and was consigned to Queen's College, in the year 1557. 3. St. Mary Hall. This was long the parsonage-house of the rectors of St. Mary, which church being appropriated by Edward III to the Oriel College, the house also came into their possession, and was appropriated to the residence of students. 4. New Inn Hall, granted to students by John Trillock, bishop of Hereford, in the year 1545. 5. Magdalen Hall. This hall is almost contiguous to Magdalen College, on the west. A very considerable part of it is the grammar-school for the choristers of Magdalen College, erected, with the college, by the founder, William of Wainfleet, for that purpose alone. To this structure other buildings being added, it grew by degrees into an academical hall. Other public buildings are, the theatre, which was built at the expense of archbishop Shelden, chancellor of the university, 1668, who gave 2000l. to purchase lands for its repairs. It is extremely magnificent, of the form of the Roman theatre, not circular but having one flat side, and the roof eighty feet by seventy, rests on the walls without pillars. Ashmole's Museum, the lower part of which is an elaboratory, and the upper story a repository of natural and artificial rarities, principally given by Elias Ashmole, who lodged here the collection of MSS. made by his father-in-law, sir William Dugdale, Anthony Wood, sir Henry Savil, and himself. The printing-house, built in the year 1712, with the profits of the sale of lord Clarendon's History of the Rebellion, the perpetual impression of which he gave to the university. Round the wall that formerly inclosed the theatre stood the Arundelian marbles, now removed into the schools. These valuable monuments collected in Greece and Asia, by Thomas earl of Arundel, and sir William Petty, were given by the said earl; others by Mr. Selden, sir George Wheler, Dr. Shaw, Messrs. Dawkins and Wood, and Dr. Rawlinson. To this collection, in the year 1755, were added, by the gift of the countess of Pomfret, above 100 statues, busts, &c. purchased by her late husband's father, lord Lempster, out of the Arundelian collection. The whole collection now at Oxford consists of 167 marbles, that is, statues, busts, bas-reliefs, fragments of sculpture; 100 inscriptions, Greek, Ægyptian, Citiean, and Palmyrene; and 145 Roman and others. The public schools, which form a magnificent quadrangle, part of which is appropriated for the reception of the celebrated Bodleian library. The Radcliffe library founded by the will of Dr. Radcliffe, and finished in the year 1749. A noble astronomical observatory has lately been erected at the north-west corner of the city, at the expense of near 30,000l. begun in the year 1771, by the trustees of Dr. Radcliffe's estate. The physic-garden was founded

by Henry Danvers, earl of Danby, in the year 1632, and endowed with an annual revenue. Dr. Sherard built the present library, furnished the gardens with most of its curious plants, and at the expense of 3000l. endowed the professorship. The unfortunate Charles I. held his court here, during the civil war. The corporation consists of a mayor, high-steward, recorder, four aldermen, eight assistants, two bailiffs, a town-clerk, two chamberlains, all that have served the office of bailiff and chamberlain, and twenty-four common-council men. The mayor, for the time being, officiates at a coronation, in the buttery, and has for his fee a large gilt bowl and cover. It was made a bishop's see by king Henry VIII. and has thirteen elegant parish churches, besides the cathedral of Christchurch. This city has often been the seat of our kings and parliaments: in one of which, held here by reason of the plague at London, in 1665, the votes were first printed. The markets are on Wednesday and Saturday. The city and the university send each two members to the British parliament. Without the town there are many ruins of the fortifications erected in the late civil wars. It has lately been embellished with a noble market-place, and a magnificent bridge: forty-five miles S.E. of Worcester, and fifty-four W.N.W. of London. Lon. 1. 15 W. Lat. 51. 46 N.

OXFORDSHIRE, a county of England, bounded on the E. by Buckinghamshire, W. by Gloucestershire, S. by Berkshire, and N. by Warwickshire and Northamptonshire. The extreme length is 48 miles, and breadth 26, but its form is very irregular. It contains 450,000 acres; is divided into 14 hundreds, and 207 parishes; has one city, and 12 market-towns; and sends 9 members to parliament. The number of inhabitants in 1801 was 109,620. The soil, though various, is fertile in corn and grass. The S. part, especially on the borders of Buckinghamshire, is hilly and woody, having a continuation of Chiltern hills running through it. The N.W. part is also elevated and stony. The middle is, in general, a rich country, watered by numerous streams running from N. to S. and terminating in the Thames. Of these, the most considerable are the Windrush, Evenlode, Cherwell, and Tame; the latter, although an inconsiderable rivulet, has obtained some importance from having been supposed to give name to the Thames. The products of Oxfordshire are chiefly those common to the midland farming counties. Its hills yield ochre, pipe-clay, and other earths, useful for various purposes. Corn and malt are conveyed from it, by the Thames, to the metropolis.

OXGANG, or OXGATE, is generally taken, in our old law-books, for fifteen acres, or as much ground as a single ox can plough in a year.

OXIDE. See OXYD.

OXIPIYCNI, in music, the name given by the ancient Greeks to high sounds in general, but more particularly to the highest of any three notes that are to one another as C to C sharp, and C sharp to D natural. The lowest were called the baripycni, and those in the middle, mesopycni.

OX-SLIP, in botany. See PRIMULA.

OX-STALL. *s.* A stand for oxen.

OXYACANTHA GALENI. (ὀξυακανθα, from ὀξυς, sharp, and ακανθα, a thorn, so called from the acidity of its fruit.) The barberry. See BERBERIS.

OXYBAPHUS, in botany, a genus of the class triandria, order monogynia. Calyx five-cleft, campanulate; corol funnel-form; nut five-sided, one-seeded, surrounded by the unfolded permanent calyx. One species; a glutinous plant of Peru, with violet flowers, resembling the mirabilis.

OXYCEDRUS. See JUNIPERUS.

OXYCOCCOS. (ὀξυκοκκος, from ὀξυς, acid, and κοκκος, a berry, so named from its acidity.) The cranberry. The berries of the vaccinium occicoccos of Linnéus are so termed in some pharmacopœias. They are about the size of our haws, and are pleasantly acid, with which intention they are used medicinally in Sweden. In this country they are mostly preserved and made into tarts.

OXYCRATE, in pharmacy, a mixture of vinegar and water, proper to assuage, cool, and refresh. The usual proportion is one spoonful of vinegar to five or six spoonfuls of water.

OXYDS, in chemistry, a compound of oxygen and some other body, in such proportion as not to produce an acid. Oxygen combines with bodies in various proportions, constituting a multiplicity of compounds with almost every substance with which it is capable of uniting. The whole of these compounds, however, may be grouped generally under two divisions: 1st, those which possess the properties of acids; and 2dly, those which are destitute of such properties. The first set of compounds are distinguished by the term acids: to the second appertains the term oxyds. It is by no means uncommon to find a compound of the same base and oxygen, belonging to both these sets, according to the proportion of oxygen which enters into the compound. In all these cases, the smaller proportion of oxygen constitutes the oxyd, the larger the acid. Hence it follows that oxyds always contain less oxygen than acids with the same base.

Oxyds may therefore exist under any of the forms of a concrete substance, a liquid, a vapour, and a gass.

As a liquid, water may be taken as an example, which is an oxyd of hydrogen; or in other words, a combination of oxygen with hydrogen, in such proportion as not to produce an acid. As a vapour, and as a gass, nitrous vapour, in some of its combinations, and nitric oxyd, may be advanced as examples; and as a concrete substance, the instances are innumerable.

Oxygen combines with three distinct sets of bodies, the simple combustibles, the incombustibles, and the metals, and forms oxyds with

every individual belonging to these sets. These oxyds vary according to the substance which constitutes the base; but all the oxyds of the simple combustibles are combustible, except the oxyd of hydrogen, which is a product of combustion; all the oxyds of the simple incombustibles are supporters of combustion; and all the oxyds of the metals are either products of combustion or supporters. Of course, the first set of oxyds (except that of hydrogen) cannot be formed by combustion; neither can the second set; but part of the third set are thus produced, some of them by the union of the oxygen of supporters without combustion.

Besides these oxyds, which may be considered as simple, because they contain but one ingredient combined with oxygen, there is another set much more numerous than themselves, consisting of oxygen united at once with two or more simple substances. These bodies may be distinguished from the others by giving them the name of compound oxyds.

Most bodies, however, are capable of combining with many different proportions of oxygen, without being rendered acid: and in every proportion they sometimes evince not different degrees of the same power, but powers and properties in themselves essentially different: a fact which is particularly the case with the metallic oxyds. There has hence been a demand for some graduating system of names, by which the same substances in these different states of oxydation might be distinguished; and Dr. Thomson has ingeniously proposed to name them as follows, from the Greek numerals. Oxyds produced by the smallest proportion of oxygen, prot-oxyds; oxyds produced by an additional dose of oxygen, deut-oxyds; by a dose still higher trit-oxyds; by a still further augmentation tetr-oxyds; and oxyds containing a full and saturating dose, per-oxyds.

Of all oxyds whatever, those produced by the union of oxygen with the metals are most worthy of consideration, as of by far the highest importance, both in a chemical view, and in relation to the arts. One of the first and most ordinary changes to which metallic substances are subject, is their combination with oxygen. This is called in chemical language, oxydation. If a metal, as, for instance, a piece of iron, be exposed to the air, when it is moist, it soon undergoes a remarkable change. It loses its metallic lustre, and the surface is covered with a brownish powder, well known by the name of rust. This change is owing to the combination of the oxygen of the atmosphere with the metal, and the rust of the metal in this state is one kind of ferruginous oxyd. The process of oxydation is effected more rapidly when metals are exposed to the action of heat; and, indeed, many metals require a very high temperature to produce the combination, while it cannot be accomplished in others by the greatest degree of heat that can be produced. This process was formerly called calcination, or calcining the metal; and the product, thus denominated an oxyd, was distinguished by the name of a calx, from its being reduced to the state of powder, in the same way as limestone, by burning. Metals differ very much from each other in the circumstances in which this oxydation takes place, as in the temperature which is necessary, the facility of the combination, the proportions of oxygen which combine, and the force of affinity between the constituent parts of the oxyd. Some metals are oxydated in the lowest temperature, as, for instance, iron and manganese; while others require the greatest degree of heat that can be applied. Such are silver, gold, and platina.

The facility with which oxydation takes place in some metals is so great, such as in iron, tin, lead, copper, and manganese, that they must be completely defended from the action of oxygen; but in gold and platina no perceptible change is observed, for whatever length of time they are exposed to the atmosphere. This oxydation, and the quantity of oxygen absorbed, are proportional to the temperature. There are, however, many metals which combine with a determinate proportion of oxygen at certain temperatures, and from this may be estimated the quantity of oxydation from the degree of heat which has been applied. The rapidity of the oxydation is almost always increased by the elevation of the temperature. In this way actual combustion or inflammation is produced. Thus filings of metals thrown upon a body in the state of ignition give out brilliant sparks; and steel, struck upon a flint, burns with a vivid flame in the air, in consequence of the great heat which is communicated to it by percussion. Metallic substances combine with very different proportions of oxygen; and this quantity varies according to the manner in which the process has been conducted, or the temperature to which the metal has been exposed.

In these different states and conditions of oxydation different phænomena are exhibited. Sometimes the metal becomes red-hot, and is inflamed; sometimes the oxydation takes place without fusion, or does not combine with oxygen till after it has been melted; sometimes it is covered with a brittle crust, or with a substance in the form of powder. At other times a pellicle, exhibiting different colours, forms on the surface; but, in all cases, the metal is tarnished, loses its brilliancy and its colour, and assumes another, which announces the change that has ensued. Another difference which takes place among metals, is the different degrees of force with which the oxygen adheres to the metal. The knowledge of this, and the different degrees of affinity between oxygen and metallic substances, is of great importance in many operations and chemical results. During the fixation of oxygen in metallic substances, it is absorbed by some in its solid state, and gives out a great deal of caloric. In others it is combined, without giving out the same quantity. This proportion of caloric given out corresponds to the facility with which oxyds part with their oxygen, or are reduced to the metallic state. Those which have combined with oxygen, with the greater proportion of caloric, are most easily reduced; but those, on the con-

trary, in which the oxygen has been deprived of its caloric, are reduced to the metallic state by a great addition of caloric, and the greatest number of oxyds require the addition of substances whose affinity for oxygen is greater than that of the metal. Metallic oxyds are extremely different in different metals, and even in the same metal, according to the proportion of oxygen. They are, however, possessed of some common properties. They are all in the form of powder or earthy substance, or so brittle as to be easily reduced to this state. They exhibit every shade of colour from pure white to brown and deep red, and they are heavier than the metals from which they have been obtained. Some oxyds are revived, as it is called, or are reduced to the metallic state, merely by being in contact with light or caloric. Some require the addition of a combustible substance and a high temperature; while others have so strong an affinity for oxygen, that they cannot be deprived of it by the strongest heat, but become fusible in the fire, and afford a glassy matter more or less coloured, and even serve as a flux to the earths. Some oxyds are volatile, but the greatest number are fixed. Some have an acrid and caustic taste, are more or less soluble in water, and even possess an acid quality; others are insoluble and insipid.

OXYD OF ARSENIC. Native calx of arsenic. See ARSENICUM.

OXYD OF BISMUTH. A peculiar ore of bismuth. See BISMUTUM.

OXYD OF NICKEL. See NICCOLUM.

OXYD OF URANITE. See URANIUM.

OXYD OF ZINC. Calamine. See ZINCUM.

OXYDATION. Oxygen gass, that is, vital air, is decomposed by metals, and some other bodies, at a higher or lower temperature; they combine with its basis or oxygen, and form various compounds, the caloric being at the same time disengaged, passes off in the state of sensible heat. The operation by which this is effected is termed oxydation, and the compound bodies thus obtained are called oxyds.

Many of the oxyds are employed in medicine: of these the following are the chief.

OXYDUM ARSENICI ALBUM. Arsenicum calcinatum. Arsenicum album. Calx arsenici. This is a most powerful caustic and poison. Internally it is said to be given with advantage in elephantiasis, and obstinate diseases of the skin, cancer, agues, and dropsies. It cannot be too carefully administered. The antidotes against it, when taken as a poison, are, solutions of ammoniacal sulphuret, potash, or soda, the carbonate of potash or soda, soap, milk, fixed oils, and mucilages. See ARSENIC.

OXYDUM CUPRI VIRIDE ACETATUM. See ÆRUGO ÆRIS.

OXYDUM FERRI LUTEUM. See RUBIGO FERRI.

OXYDUM FERRI RUBRUM. Colcothar vitrioli. Calx ferri rubra. Crocus martis. This oxyd of iron is principally used as an external remedy to lax ulcers and condylomata.

OXYDUM HYDRARGYRI NIGRUM. Æthops per se. Pulvis mercurialis cinereus. Mercurius cinereus. Turpethum nigrum. Mercurius præcipitatus niger. There are four preparations of this oxyd in high estimation: 1. The oxydum hydrargyri gummosum, made by rubbing mercury with mucilage of gum arabic. Plenk, of Vienna, has written a treatise on the superior efficacy of this medicine. It is very troublesome to make; and does not appear to possess more virtues than some other mercurial preparations. 2. The oxydum hydrargyri saccharatum, made by triturating equal parts of sugar and mercury together. 3. The oxydum hydrargyri mellitum, composed of equal parts of honey and hydrargyrus purificatus. 4. The oxydum hydrargyri unguinosum, called unguentum hydrargyri fortius in the shops. All these preparations possess anthelmintic, antisiphilitic, alterative, sialogogue, and deobstruent virtues, and are exhibited in the cure of worms, syphilis, amenorrhœa, diseases of the skin, chronic diseases, obstructions of the viscera, &c.

OXYDUM HYDRARGYRI RUBRUM. A red oxyd of mercury may be obtained either by simple exposure to heat and air, or by the nitric acid. See HYDRARGYRUS CALCINATUS, and HYDRARGYRUS NITRATUS RUBER.

OXYDUM NITROSUM. Nitrous oxyd. Nitrogen united with oxygen.

OXYDUM PLUMBI ALBUM. See CERUSSA.

OXYDUM PLUMBI RUBRUM. Minium. Calx plumbi rubra. Red lead. The red oxyd of lead possesses adstringent and sedative virtues if cautiously exhibited. Its use in the present day is in form of powder or ointment, in the cure of ulcers, prurities, and some diseases of the skin.

OXYDUM PLUMBI SEMIVITREUM. Lithargyrus. Lythargyrum. This preparation of lead is employed to make the aqua lithargyri acetata, whose use is very extensive in the practice of surgery. See AQUA LITHARGYRI ACETATI.

OXYDUM STIBII ALBUM. See ANTIMONIUM CALCINATUM.

OXYDUM STIBII SEMIVITREUM. Vitrum antimonii. This preparation of antimony is employed to make antimonial wine.

OXYDUM STIBII SULPHURATUM. Hepar antimonii. Crocus metallorum. Crocus antimonii. This preparation of antimony was formerly exhibited in the cure of fevers and atonic diseases of the lungs. Its principal use now is in preparing other medicines.

OXYDUM ZINCI ALBUM. See TUTIA.

OXYDUM ZINCI SUBLIMATUM. See ZINCUM CALCINATUM.

OXYDUM ZINCI VITRIOLATUM. See ZINCUM VITRIOLATUM.

OXYGEN, in chemistry, a simple substance that enters into the composition of water and air. The term oxygen signifies that which generates or produces acids. This, one of the most characteristic properties of this

body, was discovered by Dr. Priestley in 1774. It was at first called dephlogisticated air, and afterwards successively known by the names of eminently respirable air, pure air, vital air, as long as it was not known that this aerial form is merely one of its states of combination; which, notwithstanding its frequency, and its being less impure in this than in any other condition, does not prevent its being concealed in other states; and more particularly as, by combining with many bodies, it loses this elastic state or appearance of air. As soon as this truth was well proved, and clearly explained by Lavoisier, the necessity was admitted of giving it a different name, which might be applicable to all the states in which it could exist, as well that of gass as of the liquid or solid form. Lavoisier first called it the oxygenous principle; and the French school having decided for the word oxygen, by admitting a simple change of termination in the first word proposed by Lavoisier, this name became generally adopted.

The effect of oxygen is of such importance, that its presence must be stated as the most indispensable condition of combustion; which would not otherwise take place. It truly constitutes the essential part of that process, because its most decided and extensive character is its absolute necessity to that process.

Oxygen, like many other natural bodies, is found in three states, but in neither of them is it alone or insulated. In the gasseous form it is dissolved in caloric; in the liquid and solid form it is combined with different substances, and can never exist concrete and pure without combination, like many other substances no less decomposable than itself. And though we can, in imagination, conceive it alone, insulated, pure, and in a solid state, experiment has never yet exhibited this fact. It is a discovery which still remains concealed in the bosom of nature; or may exist, ill understood, under the name of some substance yet unknown in our collections of minerals.

As oxygen is frequently contained in a more or less solid form in several natural fossils which have undergone combustion, and as it has much attraction for caloric, it is only required that some one of those fossils should be heated more or less, or penetrated with a great quantity of caloric, in order to disengage this principle, and obtain it in the form of air or gass. This is done by chemists to procure oxygen gass. They expose certain substances, particularly metals burned by nature or by art, to a fire of considerable activity in closed vessels, so disposed as to conduct and receive, under inverted jars, the elastic fluid intended to be collected. The burned matter passes again to a combustible state; and the oxygen which gave it the burned state, being separated and fused by caloric, for which it has a great attraction, becomes developed in the form of gass. It is the product of a true combustion.

Of the two bodies which form oxygen gass, the caloric, which is the solvent, and gives it the state of invisibility and of an elastic fluid, not being ponderable, the solidifiable base or oxygen, which is dissolved, being the only ponderable and fixable body in all the substances with which this gass can combine; and chemists having no other means of obtaining oxygen in a simpler state than that of gass, in which they use it for a great number of operations or combinations; many of them are habituated to denote this gass by the simple name of oxygen. This is, nevertheless, an error of nomenclature, and inimical to the perspicuity of chemical doctrine; because the word oxygen ought only to be used to denote the base of this gass considered alone, or in all the possible states, but particularly in the numerous combinations wherein it possesses the liquid or solid state.

Oxygen is probably the most abundant of all natural bodies, and its chemical properties are so important, that a very large share of the science of chemistry consists in a knowledge of the combinations and agency of this body.

The two principal sources from which it is derived (each of them immense in extent) are water and air. In the former it is condensed into a liquid form, and combined with about a third of its weight of hydrogen; in the latter it is united with azot, and forms rather more than a fifth part of the atmosphere.

There are besides various other smaller sources of oxygen, such as many parts of the organized world, vegetable or animal (independantly of the water which they contain so abundantly), mineral acids, and metallic oxyds, &c. but the quantities from these last sources are extremely small in comparison with the preceding.

The purest possible oxygen gass is obtained by a higher degree of voltaic electricity from such substances as it is capable of completely decomposing. One of the next purest oxygen gasses is obtained by distilling, per se, the dry oxymuriat of potash.

The black oxyd of manganese contains a great quantity of oxygen so loosely combined, as to be expelled by a moderate red heat, and this is the method usually pursued. An earthen or iron retort (the latter of which is expressly manufactured for this purpose) is to be filled with the black oxyd of manganese in powder, and heated in a brisk fire. The first product of gass comes over when the manganese is faintly red, and consists chiefly of carbonic acid, so that a taper is immediately extinguished; after this, if small samples of the gass be examined as it comes over by dipping a bit of kindled wood in it, the fire will soon be found to burn with increased flame and brightness, a sign of the presence of oxygen, soon after which it may be collected for use. If the manganese be very good, one pound of it (which will lie in a very small retort) will give 1400 cubic inches of great purity; that is, containing no more than a tenth of carbonic acid or any other gass.

Manganese, if moistened with sulphuric acid, will also give out much oxygen on applying no greater heat than that of a taper;

and it may hence be obtained very expeditiously with the simplest apparatus possible.

All the oxyds of mercury, when heated red hot, are decomposed, the metals return to the state of running mercury (which is driven up in vapour and soon condenses), and the oxygen which it contained appears in the gasseous form, mixed with any acid if such existed in the oxyd.

Oxygen gass may also be obtained very cheap and considerably pure, by the destructive distillation of nitre in a moderate red heat.

Most of the green parts of vegetables while living yield oxygen gass when exposed to the sun's rays. Of these the green conferva of ponds is a remarkable instance, as Dr. Ingenhouz has shown by experiment.

The burning of the several combustible bodies in oxygen gass forms a number of most beautiful and instructive experiments, and has contributed more than any thing else to give accurate ideas on the nature of combustion in general.

The characters that peculiarly distinguish oxgyen gass are the eminent degree in which it supports combustion and respiration; it being proved that neither of these can continue without oxygen, and that it is solely owing to its presence that atmospheric air and the other compound gasses are fitted for maintaining those grand processes of the material world. If a small animal be immersed in oxygen gass, it will live much longer than in the same quantity of common air; and if the carbonic acid generated in the process be occasionally removed by alkalies, the animal will remain in the gass uninjured for a much greater length of time. In this and in many other respects the process of respiration and combustion agree, but still there are some circumstances which render it probable that the diluted state of oxygen (such as it exists in common air) is altogether fitter for animal respiration than a purer oxygen. See the article RESPIRATION.

OXYGENIZED TIN. See STANNIUM.

OXYLAPATHUM. (*oxylapathum*, ὀξυλαπαθον, from ὀξυς, acid, and λαπαθον, the dock, so named from its acidity). Lapathum acutum. Rumex acutus of Linneus. Sharp-pointed dock. Rumex floribus hermaphroditis; valvula dentatis graniferes, foliis cordato oblongis acuminatis. The decoction of the root of this plant is used in Germany to cure the itch; and it appears to have been used in the time of Dioscorides in the cure of leprous and impetigenous affections, both alone and boiled with vinegar.

OXYMEL ÆRUGINIS. This preparation, mel Ægyptiacum, has succeeded to the mel Ægyptiacum of former pharmacopœias; it is applied externally as a detergent to keep down fungus flesh. When sufficiently diluted, it serves as an useful application to scrophulous sores, and is often of service to venereal ulceration of the mouth and fauces. When employed as a collutory, great care is required lest any be swallowed.

OXYMEL COLCHICI. Oxymel of meadow saffron is an acrid medicine, but is nevertheless employed for its diuretic virtues in dropsies.

OXYMEL SCILLÆ. A very useful expectorant.

OXYMORON, or seeming contradiction, in rhetoric, is a species of antithesis, when the parts of a sentence disagree in sound, but are consistent in sense. Thus Ovid, lib. viii. ver. 47, says of Althea, *impietate pia est.*

OXYGENATED MURIATIC ACID. See OXYMURIATIC ACID.

OXYMURIATIC ACID. In chemistry, oxygenated muriatic acid. Dephlogisticated muriatic acid. Chlorine. This is one of those substances which is daily showing us how little chemistry is even at present entitled to the appellation of a science, and how few of what are usually regarded as its established principles can be firmly relied upon. We shall, as briefly as we can, state its history and its theories to the present day.

This acid was first noticed by Scheele in 1774, during his experiments on manganese. He gave it the name of dephlogisticated muriatic acid, from the supposition that it is muriatic acid deprived of phlogiston. The French chemists, after its composition had been ascertained, called it oxygenated muriatic acid; which unwieldy appellation Kirwan happily contracted into oxymuriatic acid.

It may be procured by the following process: Put into a tubulated retort a mixture of three parts of common salt, and one part of the black oxyd of manganese in powder. Place the retort in the sand-bath of a furnace, plunge its beak into a small water-trough, and lute a bent funnel into its mouth. When the mixture has acquired a moderate heat, pour into it at intervals through the bent funnel two parts of sulphuric acid, which ought to be somewhat diluted with water. An effervescence ensues; a yellowish-green coloured gass issues from the retort, which may be received in large phials fitted with ground stoppers.

Oxymuriatic acid gass is of a yellowish-green colour. Its odour is intolerably acrid and suffocating. It cannot be breathed without proving fatal. The death of the ingenious and industrious Pelletier, whose chemical labours have been so useful to the world, was occasioned by his attempting to respire it. A consumption was the consequence of this attempt, which, in a short time, proved fatal. When atmospheric air containing a mixture of it is breathed, it occasions a violent and almost convulsive cough, attended with much pain in the chest. This cough usually continues to return at intervals for a day or two, and is accompanied with a copious expectoration.

It is capable of supporting combustion, in many cases even more capable than common air. When a burning taper is plunged into it the flame is diminished, and acquires a very red colour; a great quantity of smoke is emitted, and at the same time the taper consumes much more rapidly than in common air.

This gass is neither altered by exposure to light nor to caloric. It passes unaltered through red-hot porcelain tubes.

It does not unite readily with water. Scheele found that after standing twelve hours over water, four-fifths of the gass were absorbed; the remainder was common air which, no doubt, had been contained in the vessel before the operation.

It renders vegetable colours white, and not red as other acids do; and the colour thus destroyed can neither be restored by alkalies nor acids. It

has the same effect on yellow wax. If the quantity of vegetable colours to which it is applied be sufficiently great, it is found reduced to the state of common muriatic acid. This property has rendered oxymuriatic acid a very important article in bleaching.

When a mixture of oxymuriatic gass and hydrogen gass is made to pass through a red-hot porcelain tube, a violent detonation takes place. By common electricity a feeble explosion is produced.

When melted sulphur is plunged into it, inflammation also ensues, and the sulphur is converted into sulphuric acid; but cold sulphur, though it is partly acidified by this gass, does not take place in it.

When phosphorus is plunged into this gass, it immediately takes fire, burns with considerable splendour, and is converted into phosphoric acid.

Oxymuriatic acid oxydizes all the metals without the assistance of heat. Several of them take fire as soon as they come into contact with the gass. All that is necessary is, to throw a quantity of the metal reduced to a fine powder into a vessel filled with the gass. The inflammation takes place immediately; the metal is oxydized; while the acid, decomposed and reduced to common muriatic acid, combines with the oxyd, and forms a muriat. Arsenic burns in oxymuriatic acid gass with a blue and green flame; bismuth, with a lively blueish flame; nickel, with a white flame, bordering on yellow; cobalt, with a white flame, approaching to blue; zinc, with a lively white flame; tin, with a feeble blueish flame; lead, with a sparkling white flame; copper and iron, with a red flame. Several of the metallic sulphurets, as cinnebar, realgar, sulphuret of antimony, take fire when thrown in powder into this gass.

When oxymuriatic gass and ammoniacal gass are mixed together, a rapid combustion, attended with a white flame, instantly takes place; both the gasses are decomposed, water is formed, while azotic gass and muriatic acid are evolved. The same phænomena are apparent, though in a smaller degree, when liquid ammonia is poured into the acid gass. The same decomposition takes place, though both the acid and alkali are in a liquid state. If four-fifths of a glass tube be filled with oxymuriatic acid, and the remaining fifth with ammonia, and the tube be then inverted over water, an effervescence ensues, and azotic gass is extricated.

Old theory of oxymuriatic acid.—In consequence of these and other experiments of a similar kind, it was for many years suspected that oxymuriatic acid was a compound of muriatic acid and oxygen; and the proportions were stated as follows by Berthollet:

Muriatic acid	89
Oxygen	11
	100

Mr. Chevenix was not quite satisfied with the method by which this result appeared to be obtained; and he proposed another method, which seemed to render the relative proportions thus:

Muriatic acid	84
Oxygen	16
	100

At the present time of day it is not necessary to detail the experiments which led to these results; because various later experiments of Mr. Davy, so far as they go, seem to overthrow the experiments themselves, and the whole system on which they are founded. It is necessary, however, first of all to notice a very important compound produced, as was lately supposed, by the union of the same substance with an additional quantity of oxygen, and hence commonly denominated hyperoxymuriatic acid. The existence of this acid was first suspected by M. Berthollet, though he satisfied himself with little more than strong analogy. It was afterwards put out of doubt by the experiments of Mr. Chevenix.

If a solution of potash in six times its weight of water be put into a Woulfe's bottle, and a stream of oxymuriatic acid be made to pass through it in the usual way till the potash is saturated, crystals in the form of fine white scales are deposited in considerable quantity. These crystals have received the name of hyperoxygenated muriat of potash. They possess very curious and important properties. If the liquid from which this salt is deposited be evaporated to dryness, another salt will be obtained composed of muriatic acid and potash.

These facts were all discovered by Berthollet; who concluded from them that the oxymuriatic acid had been decomposed during the process; that one portion of it lost the whole of its oxygen, and was reduced to the state of muriatic acid, while another portion combined with an additional dose of oxygen, and became converted into hyperoxymuriatic acid. This theory, however, was at first only regarded as plausible, till Mr. Chevenix published his important dissertation on the subject, which at the time was supposed to have confirmed it in the amplest manner desirable. He exposed 100 grains of hyperoxymuriat of potash to the heat of a lamp: it lost 2.5 of its weight, which he ascertained to be water. When heated to redness a violent effervescence took place, and 112.5 cubic inches of oxygen gass or 38.3 grains were extricated. The salt which remained in the retort amounted to 53.5 grains, and 5 grains had been volatilized during the process. Accordingly he calculated that hyperoxymuriat of potash is composed of

2.5	water
38.3	oxygen
58.5	muriat of potash
99.3	

But Mr. Chevenix ascertained that the muriatic acid remaining in this saline residue amounted to 20 grains. Therefore 38.3 parts of oxygen and 20 parts of muriatic acid constitute 58.3 parts of the acid which exists in the hyperoxymuriat of potash. That acid was therefore calculated to be composed of about

66	oxygen
34	muriatic acid
100	

and by this experiment and its result it was supposed that the theory of Berthollet was fully confirmed.

But though the peculiar nature of hyperoxymuriatic acid has been thus demonstrated, all attempts to procure it in a separate state have hitherto failed; and hence its properties are but imperfectly known. From the amazing energy with which hyperoxymuriat of potash acts upon combustible bodies it is obvious that it possesses the property of supporting combustion. It combines also with alkalies, earths, and metallic oxyds, and forms salts of a very peculiar nature.

The hyperoxymuriat of potash is chiefly used in the laboratory, where it is employed in the pre-

paration of the purest oxygen gass. A few grains of it stirred into an ounce of common muriatic acid forms a useful extemporaneous bleaching liquor for various purposes. It has been attempted in France to compose a gunpowder of this salt, instead of nitre, but without success; the mixture exploded while it was grinding, and killed two persons who were standing near.

Hypermuriat of soda is obtained in the same manner as that of potash. It is very difficult to obtain it pure, on account of its solubility in water being little different from that of muriat of soda. It is made no use of.

The earthy hypermuriats are not so easily prepared as the alkaline, on account of the inferior affinity subsisting between their ingredients, and the inferior solubility of the bases. They are usually obtained by introducing the earthy base into a Woulfe's bottle, diffused in warm water, and suffering a current of oxymuriatic gass to pass through the liquor till complete saturation. The salts thus obtained are

Hyperoxymuriat of barytes.
Hyperoxymuriat of strontian.
Hyperoxymuriat of lime.
Hyperoxymuriat of magnesia.
Hyperoxymuriat of alumine.

None of these are appropriated to any important use except the hyperoxymuriat of lime, which is an excellent bleaching material. It is extremely deliquescent, and melts at a very gentle heat in its water of crystallization. It is very soluble in alkohol, has a sharp bitter taste, and produces much cold in the mouth. It consists of

55.2 hyperoxymuriatic acid.
28.3 lime.
16.5 water.

100.0

The substance chiefly used for bleaching, however, is not the pure salt, but the entire liquor formed by saturating a very thick milk of lime with oxymuriatic acid gass. The calico printers find that this will effectually bleach the unprinted ground, without touching the coloured pattern; and this unquestionably appears to be the case: but the remarkable fugitiveness of the colours of modern printed calicoes is in all probability to be mainly attributed to the substitution of the more speedy method of colouring to the old and more tedious but safer method.

New theory of oxymuriatic acid.—Thus far we have limited ourselves to the mode by which the existence of oxymuriatic acid was explained from its detection till the year 1808, and have treated of the various compounds to which it gives rise, and the various purposes to which it is applied under the old nomenclature, and the old theory during whose existence and influence they were respectively brought forwards. Under this theory we have already observed oxymuriatic acid was regarded as a compound substance, the constituent principles of which were muriatic acid and oxygen. A variety of facts, however, have been from time to time arising that have induced a strong suspicion in the minds of many chemists that this received theory of the oxymuriatic acid had been adopted on insufficient grounds. Mr. Davy appears to have been long very powerfully influenced by this suspicion. It was especially observed by him, that muriatic acid could never be obtained from oxymuriatic acid, or from dry muriats, unless water or its constituent parts were present. He has also stated in several of his very valuable papers upon this subject in the Philosophical Transactions for 1810 and 1811, that charcoal when heated to whiteness by the galvanic battery in oxymuriatic or muriatic gasses produces no change whatever in those gasses, if it had been previously deprived by ignition of moisture and hydrogen; facts that are singularly irreconcilable with the received doctrine that oxymuriatic is a compound of muriatic acid and oxygen; or presuming from analogy, that muriatic acid is already composed of oxygen and an acidifiable base, regards oxymuriatic acid as consisting of that radical in a higher state of oxygenation. For if this were a just account of the matter, we might fairly expect to find muriatic acid result from deoxygenating the oxymuriatic acid, whether water were present or not; and unless water, or its elements, be in some shape essential to oxymuriatic acid, it seems difficult to perceive why the production of that acid, whether from oxymuriatic acid, or from muriats, should be impossible without the presence of moisture or hydrogen.

In another experiment, tin, exposed under a certain degree of heat, to oxymuriatic acid, both the metal and gass disappeared, leaving a liquor exactly similar to that known by the name of liquor of Libavius, which is a muriat of tin. To this fluid ammoniacal gass was exhibited, and it was greedily absorbed, forming a white solid body, the whole of which volatilized on the application of heat. In another experiment it was found equally impossible to decompose this liquor by ammonia. Instead of yielding oxyd of tin as might have been expected, it formed a new compound. In like manner, ammonia was exhibited to the solid compound of oxymuriatic acid, and phosphorus obtained by combustion; and a white opake powder was the result, which though exposed to a high degree of heat, remained quite fixed and undecomposed. This, as Mr. Davy remarks, offers a singular phænomenon: a mixture of three bodies all extremely volatile, and two of them never known to exist in a fixed state, except in composition with other bodies, is found to produce a compound highly fixed and refractory. He accordingly was at some pains to ascertain its qualities; but these do not seem to merit any particular description. Suffice it to say, that this substance can only be decomposed by combustion, and by the action of ignited hydrat of potash. He made similar attempts to obtain oxygen, or a body containing oxygen, from the phosphuretted muriatic liquor of Dr. Thomson. He operated by means of dry ammonia; and always obtained solid compounds, more or less refractory, but never yielding oxygen or oxyds.

Mr. Davy found reason to believe also, that the common idea that oxymuriatic acid and ammonia, acting on each other, produce water, has been taken up on insufficient grounds: for he found that, when those bodies were mixed in the proportion of about one of acid to three of alkali, both in a dry, and, of course, gasseous state, no water was formed; but the product was dry and solid muriat of ammonia, with about a tenth part of nitrogen gass.

It has since been found by the French chemists, upon their following up an experiment of Mr. Cruikshanks, that oxymuriatic acid and hydrogen, when mixed in nearly equal proportions, produced a gass condensable by water, and consisting

of dry muriatic acid. This important and almost decisive experiment was carefully repeated by Mr. Davy. He fired the two gasses in an exhausted receiver, by the electric spark, and always obtained muriatic acid gass, and a slight condensed vapour, with a diminution of one-tenth of the volume. When highly dried sulphuretted hydrogen was used, with oxymuriatic acid. In this case sulphur, slightly tinged with oxymuriatic acid, was left on the sides of the vessel; no vapour was deposited; and the gass which remained consisted of muriatic acid, and about $\frac{1}{25}$ of an inflammable gass.

All these experiments, and various others directed to the same object, have been repeatedly tried by Mr. Davy, and it is impossible for us to give the general results in more compressed terms than in the following, in which he sums up the whole in his very valuable Bakerian lecture, inserted in Part I. of the Philosophical Transactions for 1811.

"All the conclusions, which I ventured to draw in my last communication to the society, will, I trust, be found to be confirmed by the whole series of these new inquiries.

"Oxymuriatic gass combines with inflammable bodies, to form simple binary compounds; and in these cases, when it acts upon oxyds, it either produces the expulsion of their oxygen, or causes it to enter into new combinations.

"If it be said, that the oxygen arises from the decomposition of the oxymuriatic gass, and not from the oxyds; it may be asked, why it is always the quantity contained in the oxyd; and why in some cases, as those of the peroxyds of potassium and sodium, it bears no relation to the quantity of gass.

If there existed any acid matter in oxymuriatic gass, combined with oxygen, it ought to be exhibited in the fluid compound of one proportion of phosphorus, and two of oxymuriatic gass; for this, on such an assumption, should consist of muriatic acid (on the old hypothesis, free from water) and phosphorous acid; but this substance has no effect on litmus paper, and does not act, under common circumstances, on fixed alkaline bases, such as dry lime or magnesia. Oxymuriatic gass, like oxygen, must be combined in large quantity with peculiar inflammable matter, to form acid matter. In its union with hydrogen, it instantly reddens the driest litmus paper, though a gasseous body. Contrary to acids, it expels oxygen from protoxyds, and combines with peroxyds.

"When potassium is burnt in oxymuriatic gass, a dry compound is obtained. If potassium combined with oxygen is employed, the whole of the oxygen is expelled, and the same compound formed. It is contrary to sound logic to say, that this exact quantity of oxygen is given off from a body not known to be compound, when we are certain of its existence in another; and all the cases are parallel.

"An argument in favour of the existence of oxygen in oxymuriatic gass may be derived by some persons from the circumstances of its formation, by the action of muriatic acid on peroxyds, or on hyperoxymuriate of potash; but a minute investigation of the subject will, I doubt not, show, that the phenomena of this action are entirely consistent with the views I have brought forward. By heating muriatic acid gass in contact with dry peroxyd of manganese, water I found was rapidly formed, and oxymuriatic gass produced, and the peroxyd rendered brown. Now as muriatic acid gass is known to consist of oxymuriatic gass and hydrogen, there is no simple explanation of the result, except by saying, that the hydrogen of the muriatic acid combined with oxygen from the peroxyd to produce water.

"Scheele explained the bleaching powers of the oxymuriatic gass by supposing that it destroyed colours by combining with phlogiston. Berthollet considered it as acting by supplying oxygen. I have made an experiment, which seems to prove, that the pure gass is incapable of altering vegetable colours; and that its operation in bleaching depends entirely upon its property of decomposing water, and liberating its oxygen.

"I filled a glass globe, containing dry powdered muriate of lime, with oxymuriatic gass. I introduced some dry paper tinged with litmus, that had been just heated, into another globe containing dry muriate of lime; after some time this globe was exhausted, and then connected with the globe containing the oxymuriatic gass, and by an appropriate set of stopcocks, the paper was exposed to the action of the gass. No change of colour took place, and after two days there was scarcely a perceptible alteration.

"Some similar paper dried, introduced into gass that had not been exposed to muriate of lime, was instantly rendered white.

"Paper that had not been previously dried, brought into contact with dried gass, underwent the same change, but more slowly.

"The hyperoxymuriates seem to owe their bleaching powers entirely to their loosely combined oxygen; there is a strong tendency in the metal of those in common use to form simple combinations with oxymuriatic gass, and the oxygen is easily expelled or attracted from them.

"It is generally stated in chemical books, that oxymuriatic gass is capable of being condensed and crystallized at a low temperature; I have found by several experiments, that this is not the case. The solution of oxymuriatic gass in water freezes more readily than pure water, but the pure gass dried by muriate of lime undergoes no change whatever, at a temperature of 40 below 0° of Fahrenheit. The mistake seems to have arisen from the exposure of the gass to cold in bottles containing moisture.

"I attempted to decompose boracic and phosphoric acids by oxymuriatic gass, but without success: from which it seems probable, that the attractions of boracium and phosphorus for oxygen are stronger than for oxymuriatic gass. And from the experiments I have already detailed, iron and arsenic are analogous in this respect, and probably some other metals.

"Potassium, sodium, calcium, strontium, barium, zinc, mercury, tin, lead, and probably silver, antimony, and gold, seem to have a stronger attraction for oxymuriatic gass than for oxygen.

"I have as yet been able to make very few experiments on the combinations of the oxymuriatic compounds with each other, or with oxyds. The liquor from arsenic, and that from tin, mix, producing an increase of temperature; and the phosphuretted and the sulphuretted liquors unite with each other, and with the liquor of Libavius, but without any remarkable phenomena.

"I heated lime gently in a green glass tube, and passed the phosphoric sublimate, the saturated oxymuriat of phosphorus through it, in vapour; there was a violent action with the production of

heat and light, and a gray fused mass was formed, which afforded, by the action of water, muriate and phosphate of lime.

"I introduced some vapour from the heated phosphoric sublimate into an exhausted retort containing dry paper tinged with litmus; the colour slowly changed to pale red. This fact seems in favour of the idea, that the substance is an acid; but as some minute quantity of aqueous vapour might have been present in the receiver, the experiment cannot be regarded as decisive; the strength of its attraction for ammonia is perhaps likewise in favour of this opinion. All the oxymuriats that I have tried, indeed, form triple compounds with this alkali; but the phosphorus is expelled by a gentle heat from the other compounds of oxymuriatic gass and phosphorus with ammonia, and the substance remaining in combination is the phosphoric sublimate.

"To call a body which is not known to contain oxygen, and which cannot contain muriatic acid, oxymuriatic acid, is contrary to the principles of that nomenclature in which it is adopted; and an alteration of it seems necessary to assist the progress of discussion, and to diffuse just ideas on the subject. If the great discoverer of this substance had signified it by any simple name, it would have been proper to have recurred to it; but dephlogisticated marine acid is a term, which can hardly be adopted in the present advanced æra of the science.

"After consulting some of the most eminent chemical philosophers in this country, it has been judged most proper to suggest a name founded upon one of its obvious and characteristic properties—its colour, and to call it CHLORINE, or CHLORIC gass.

"Should it hereafter be discovered to be a compound, and even to contain oxygen, this name can imply no error, and cannot necessarily require a change.

"Most of the salts, which have been called muriates, are not known to contain any muriatic acid, or any oxygen. Thus Libavius's liquor, though converted into a muriat by water, contains only tin and oxymuriatic gass, and horn-silver seems incapable of being converted into a true muriate.

"I venture to propose for the compounds of oxymuriat gass and inflammable matter the name of their bases, with the termination *ane*. Thus argentane may signify horn-silver; stannane, Libavius's liquor; antimonane, butter of antimony; sulphurane, Dr. Thomson's sulphuretted liquor; and so on for the rest.

"In cases when the proportion is one quantity of oxymuriatic gass and one of inflammable matter, this nomenclature will be competent to express the class to which the body belongs, and its constitution. In cases when two or more proportions of inflammable matter combine with one of gass; or two or more of gass, with one of inflammable matter; it may be convenient to signify the porportions by affixing vowels before the name, when the inflammable matter predominates, and after the name, when the gass is in excess: and in the order of the alphabet, *a* signifying two, *e* three, *i* four, and so on.

"The name muriatic acid, as applied to the compound of hydrogen and oxymuriatic gass, there seems to be no reason for altering. And the compounds of this body with oxyds should be characterised in the usual manner, and as the other neutral salts.

"Thus muriat of ammonia and muriat of magnesia are perfectly correct expressions."

Since the publication of the Bakerian lecture, Mr. Davy, in the farther prosecution of his experiments, has found that oxymuriatic gass and oxygen gass may be made to unite and form a very singular compound. The oxymuriatic gass was prepared from the oxyd of manganese, which is far more uniform in its appearance, and pure in its nature, than when obtained by any other means. The quantities in which these substances combined were as 7.5 of the oxymuriatic gass to 32.9 of the oxygen gass. The compound hereby obtained is highly explosive, and so easily decomposable that it is dangerous to operate upon considerable quantities. It was with some difficulty obtained in a pure form by applying heat to a solution of it in water; but in this case there was a partial decomposition, and some oxygen was disengaged and some oxymuriatic gass formed.

"The smell of the pure explosive gass somewhat resembles that of burnt sugar, mixed with the peculiar smell of oxymuriatic gass. Water appeared to take up eight or ten times its volume; but the experiment was made over mercury, which might occasion an error, though it did not seem to act on the fluid. The water became of a tint approaching to orange.

"When the explosive gass was detonated with hydrogen equal to twice its volume, there was a great absorption, to more than ⅓, and solution of muriatic acid was formed; and when the explosive gass was in excess, oxygen was always expelled, a fact demonstrating the stronger attraction of hydrogen for oxymuriatic gass than for oxygen.

"I have said that mercury has no action upon this gass in its purest form at common temperatures. Copper and antimony, which so readily burn in oxymuriatic gass, did not act upon the explosive gass in the cold: and when they were introduced into it, being heated, it was instantly decomposed, and its oxygen set free; and the metals burnt in the oxymuriatic gass.

"When sulphur was introduced into it, there was at first no action, but an explosion soon took place: and the peculiar smell of oxymuriate of sulphur was perceived.

"Phosphorus produced a brilliant explosion, by contact with it in the cold, and there were produced phosphoric acid and solid oxymuriate of phosphorus.

"Arsenic introduced into it did not inflame; the gass was made to explode, when the metal burnt with great brilliancy in the oxymuriatic gass.

"Iron wire introduced into it did not burn, till it was heated so as to produce an explosion, when it burnt with a most brilliant light in the decomposed gass.

"Charcoal introduced into it ignited, produced a brilliant flash of light, and burnt with a dull red light, doubtless owing to its action upon the oxygen mixed with the oxymuriatic gass.

"It produced dense red fumes when mixed with nitrous gass, and there was an absorption of volume.

"When it was mixed with muriatic acid gass, there was a gradual diminution of volume. By the application of heat the absorption was rapid, oxymuriatic gass was formed, and a dew appeared on the sides of the vessel.

"These experiments enabled us to explain the contradictory accounts that have been given by

different authors of the properties of oxymuriatic gass.

"That the explosive compound has not been collected before is owing to the circumstance of water having been used for receiving the products from hyperoxymuriate of potash, and unless the water is highly saturated with the explosive gass, nothing but oxymuriatic gass is obtained; or to the circumstance of too dense an acid having been employed.

"This substance produces the phenomena, which Mr. Chenevix, in his able paper on oxymuriatic acid, referred to the hyperoxygenized muriatic acid; and they prove the truth of his ideas respecting the possible existence of a compound of oxymuriatic gass and oxygen in a separate state.

"The explosions produced in attempts to procure the products of hyperoxymuriat of potash by acids are evidently owing to the decomposition of this new and extraordinary substance.

"All the conclusions, which I have ventured to make respecting the undecompounded nature of oxymuriatic gass, are, I conceive, entirely confirmed by these new facts.

"If oxymuriatic gass contained oxygen, it is not easy to conceive why oxygen should be afforded by this new compound to muriatic gass, which must already contain oxygen in intimate union. Though on the idea of muriatic acid being a compound of hydrogen and oxymuriatic gass, the phænomena are such as might be expected.

"If the power of bodies to burn in oxymuriatic gass depended upon the presence of oxygen, they all ought to burn with much more energy in the new compound; but copper, and antimony, and mercury, and arsenic, and iron, and sulphur have no action upon it, till it is decomposed; and they act then according to their relative attractions on the oxygen, or on the oxymuriatic gass.

"There is a simple experiment, which illustrates this idea: let a glass vessel containing brass foil be exhausted, and the new gass admitted, no action will take place; throw in a little nitrous gass, a rapid decomposition occurs, and the metal burns with great brilliancy.

"Supposing oxygen and oxymuriatic gass to belong to the same class of bodies; the attraction between them might be conceived very weak, as it is found to be, and they are easily separated from each other, and made repulsive, by a very low degree of heat.

"The most vivid effects of combustion known are those produced by the condensation of oxygen or oxymuriatic gass; but in this instance, a violent explosion with heat and light are produced by their separation, and expansion, a perfectly novel circumstance in chemical philosophy.

"This compound destroys dry vegetable colours, but first gives them a tint of red. This and its considerable absorbability by water would incline one to adopt Mr. Chenevix's idea, that it approaches to an acid in its nature. It is probably combined with the peroxyd of potassium in the hyperoxymuriate.

"That oxymuriatic gass and oxygen combine and separate from each other with such peculiar phenomena, appears strongly in favour of the idea of their being distinct, though analogous species of matter. It is certainly possible to defend the hypothesis, that oxymuriatic gass consists of oxygen united to an unknown basis; but it would be possible likewise to defend the speculation, that it contains hydrogen.

"Like oxygen, it has not yet been decomposed; and I sometime ago made an experiment, which, like most of the others I have brought forward, is very adverse to the idea of its containing oxygen.

"I passed the solid oxymuriat of phosphorus in vapour, and oxygen gass together through a green glass tube heated to redness.

"A decomposition took place, and phosphoric acid was formed, and oxymuriatic gass was expelled.

"Now, if oxygen existed in the oxymuriat of phosphorus, there is no reason why this change should take place. On the idea of oxymuriatic gass being undecompounded, it is easily explained. Oxygen is known to have a stronger attraction for phosphorus than oxymuriatic gass has, and consequently ought to expel it from this combination.

"As the new compound in its purest form is possessed of a bright yellow-green colour, it may be expedient to designate it by a name expressive of this circumstance, and its relation to oxymuriatic gass. As I have named that elastic fluid chlorine, so I venture to propose for this substance the name EUCHLORINE, or EUCHLORIC gass from ευ and χλωρος."

Of the general correctness of all these experiments we have no doubt, and the reasoning exercised upon them is fair and plausible, yet we must confess not perfectly satisfactory to us at present. Should it prove so at last, and that after having been taught (even upon the recent views of chemistry) to regard oxygen as an acidifying principle, and as the sole acidifying principle in nature, we should now be called upon to regard it as an alkalescent as well as an acidifying principle, and to learn, that so far from being the sole principle either as to the one effect or the other, there is yet another substance that possesses the greater number of its very extraordinary properties, and is entitled to share the same honours and distinctions—we shall no doubt be obliged to rejoice at the progress of science; but our joy will be mixed with trembling when we reflect on the precarious tenure by which chemical truth is holden: for it may after this be most reasonably doubted whether future discoveries may not utterly destroy the merits of all the later improvements (as they have been hitherto thought) in pneumatic chemistry, and bring us back to the doctrine of phlogiston, with the single exception of the positive levity of that body; perhaps the only part of Stahl's theory (or rather of the changes made upon it by his followers) to which no enlargement of science can reconcile us.

With the fullest sense, however, of the obligations due from the world to the different series of experiments essayed by the distinguished chemist to whom we have all along alluded, still we cannot conclude without observing that more, much more, is yet wanting to render the whole perfectly satisfactory and demonstrative. We want to have it established, not only that the oxymuriatic acid may be, and probably is, a simple substance, but that it actually is so, and cannot be otherwise: for at present it is possible to resolve all the experiments we have enumerated or alluded to into its being a compound of oxygen and some unknown base. Mr. Murray, indeed, has entered into a long controversy with Mr. Davy, and his ingenious brother, Mr. J. Davy, with a view of proving that it actually is so. We cannot, however, avoid saying, that we are somewhat less satisfied with Mr. Murray's experiments than with Mr. Davy's; so

that although oxymuriatic acid may possibly be such a compound, Mr. Murray has by no means established, in our view of the question, that it is so.

We shall still watch with a scrupulous eye and an anxious expectation the progress of this interesting research, and may yet, perhaps, in the form of an appendix to the present work, be enabled to communicate to our readers the full and decisive result.

OXYOPIA. (*oxyopia*, οξυωπια, from οξυς, acute, and οψις, vision.) The faculty of seeing more acutely than usual. Thus there have been instances known of persons who could see the stars in the daytime. The proximate cause is a preternatural sensibility of the retina. It has been known to precede the gutta serena; and it has been asserted, that prisoners who have been long detained in darkness have learned to read and write in darkened places.

OXYPHOENICON. See TAMARINDUS.

OXYPORUS. In the entomology of Fabricius, a tribe of the coleopterous genus STAPHELINUS, which see.

OXYS ALBA. See LIGULA.

OYER, in law-books, seems to have been anciently used for what is now called assises. See ASSISE.

OYES, a corruption of the French *oyez*, hear ye; a term or formula frequently used by the criers in our courts on making proclamations, or to enjoin silence.

OYSTER. In helminthology. See OSTREA.

OYSTER-CATCHER. In ornithology. See HÆMATOPUS.

OYSTERSHELL. See OSTREA.

OYSTERWENCH. OYSTERWOMAN. *s.* (*oyster* and *wench*, or *woman*.) A woman whose business is to sell oysters (*Shakspeare*).

OZANAM (James), an eminent French mathematician, born at Boligneux in Bresse, in 1640, of a wealthy family. His father gave him a good education, and designed him for the church: but some mathematical books falling into his hands, inspired him with a love for that science; and though he had no master to instruct him, he made such progress in it, that, at 15 years of age, he wrote a piece in mathematics, which he thought proper to insert in the works he afterwards published. He at length taught that science at Lyons; and his mathematical lessons brought him in a considerable revenue, till the year 1701: at which period, a war breaking out on the succession to the crown of Spain, he lost almost all his scholars, and was reduced to a very melancholy situation; and his wife dying the same year, he was so afflicted, that he never perfectly recovered it. In 1702 he was admitted into the Royal Academy of Sciences; and died of an apoplexy in 1717.

Ozanam was of a mild and calm disposition, a chearful and pleasant temper, endeared by a generosity almost unparalleled. His manners were irreproachable after marriage; and he was sincerely pious, and zealously devout, though studiously avoiding to meddle in theological questions. He used to say, that it was the business of the Sorbonne to discuss, of the pope to decide, and of a mathematician to go straight to heaven in a perpendicular line. He wrote a great number of useful books; a list of which is as follows:—1. A treatise of Practical Geometry; 12mo. 1684. 2. Tables of Sines, Tangents and Secants; with a treatise of Trigonometry; 8vo. 1685. 3. A treatise of Lines of the First Order; of the Construction of Equations; and of Geometric Lines, &c.; 4to. 1687. 4. The Use of the Compasses of Proportion, &c.; with a treatise on the Division of Lands; 8vo. 1688. 5. An Universal Instrument for readily resolving Geometrical Problems without calculation; 12mo. 1688. 6. A Mathematical Dictionary; 4to. 1690. 7. A General Method for drawing Dials, &c.; 12mo. 1693. 8. A Course of Mathematics, in 5 volumes, 8vo. 1693. 9. A treatise on Fortification, Ancient and Modern; 4to. 1693. 10. Mathematical and Philosophical Recreations; 2 vols. 8vo. 1694; and again with additions in 4 vols. 1724. 11. New Treatise on Trigonometry; 12mo. 1699. 12. Surveying, and measuring all sorts of Artificers Works; 12mo. 1696. 13. New Elements of Algebra; 2 vols. 8vo. 1702. 14. Theory and Practice of Perspective; 8vo. 1711. 15. Treatise of Cosmography and Geography; 8vo. 1711. 16. Euclid's Elements, by De Chales, corrected and enlarged; 12mo. 1709. 17. Boulanger's Practical Geometry enlarged, &c.; 12mo. 1691. 18. Boulanger's treatise on the Sphere corrected and enlarged; 12mo. —Ozanam has also the following pieces in the Journal des Sçavans: viz. 1. Demonstration of this theorem, that neither the Sum nor the Difference of two Fourth Powers, can be a Fourth Power; Journal of May, 1680. 2. Answer to a Problem proposed by M. Comiers; Journal of Nov. 17, 1681. 3. Demonstration of a Problem concerning False and Imaginary Roots; Journal of April 2 and 9, 1685. 4. Method of finding in Numbers the Cubic and Sursolid Roots of a Binomial, when it has one; Journal of April 9, 1691. Also in the Memoires de Trevoux, of December, 1703, he has this piece, viz. Answer to certain articles of Objection to the first part of his Algebra. And lastly, in the Memoirs of the Academy of Sciences, of 1707, he has Observations on a Problem of Spherical Trigonometry.

OZE. (from οζω, to smell). In medicine, a fetid breath.

OZÆNA. (οζαινα, from οζη, a stench). A malignant ulcer in the nostrils.

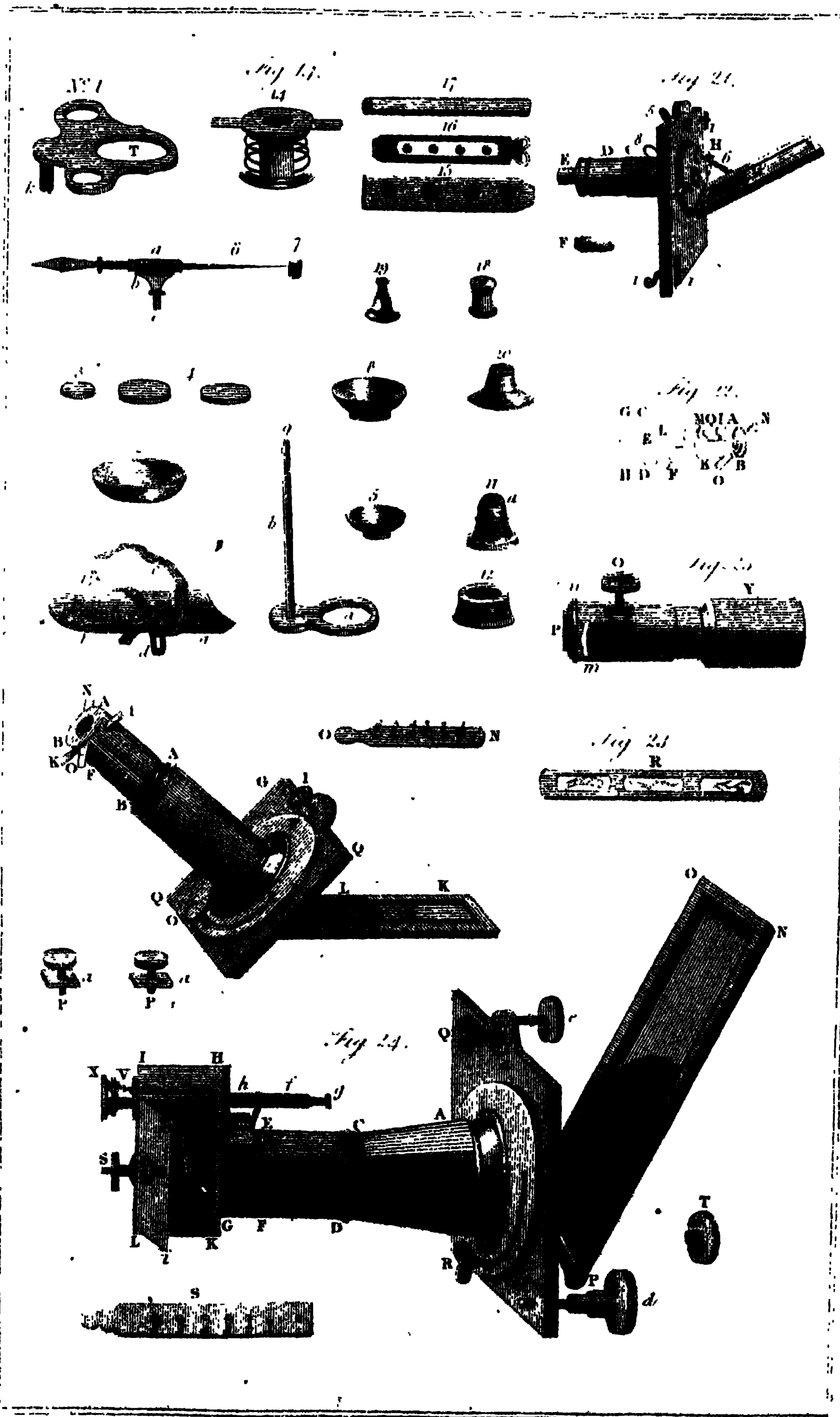
OZELL (John), a well-known translator, educated in Christ's hospital, was possessed of a competent fortune, and always enjoyed good places, being auditor general of the city and bridge accounts, of St. Paul's cathedral, and of St. Thomas's hospital. Notwithstanding his attention to business, he still retained a love for polite literature: and though he did not appear as an original author, yet having made himself master of most of the living languages, he favoured the world with many translations from these, as well as from the Latin and Greek; which,

if they are not the most elegant, are generally faithful and true to the originals. He died in the year 1743.

OZOLÆ or OZOLI, a people who inhabited the eastern parts of Ætolia, which were called Ozolea. This tract of territory lay at the north of the bay of Corinth, and extended about 12 miles northward. They received their name, it is said, from the bad stench (ὀζη) of the stagnated water in the neighbouring lakes and marshes. The name of Ozolæ, on account of its indelicate signification, highly displeased the inhabitants, and they exchanged it soon for that of Ætolians.

OZOPHYLLUM, in botany, a genus of the class monodelphia, order pentandria. Calyx five-toothed; corol five-petalled, funnel-form; style one; capsule supposed to be five-celled. One species: a Guiana shrub, with alternate leaves and white flowers in a terminal corymb.

END OF THE EIGHTH VOLUME.



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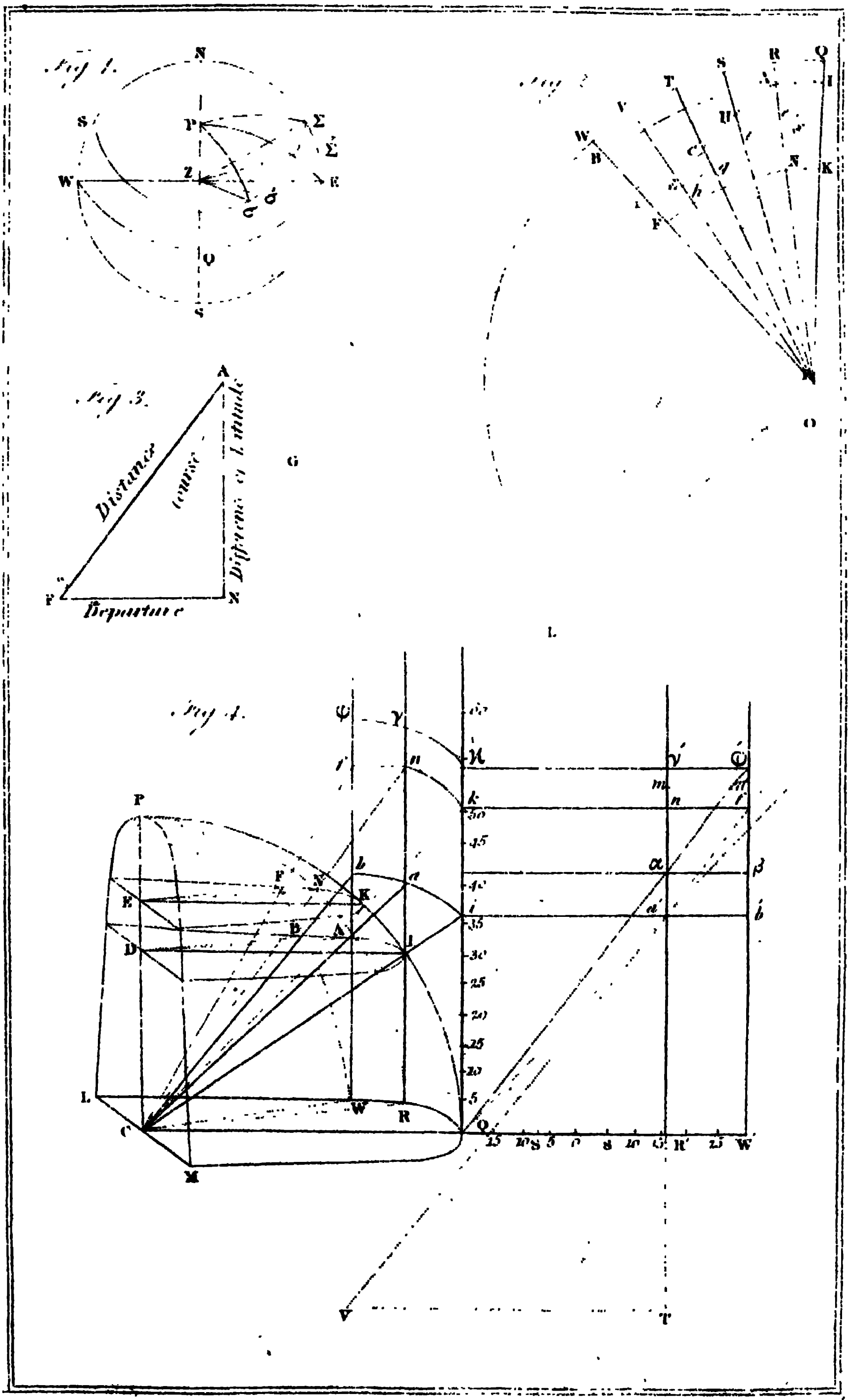
Fig. 1.
Fig. 2.
Fig. 3.
Distance
Course
Difference of Latitude
Departure
Fig. 4.

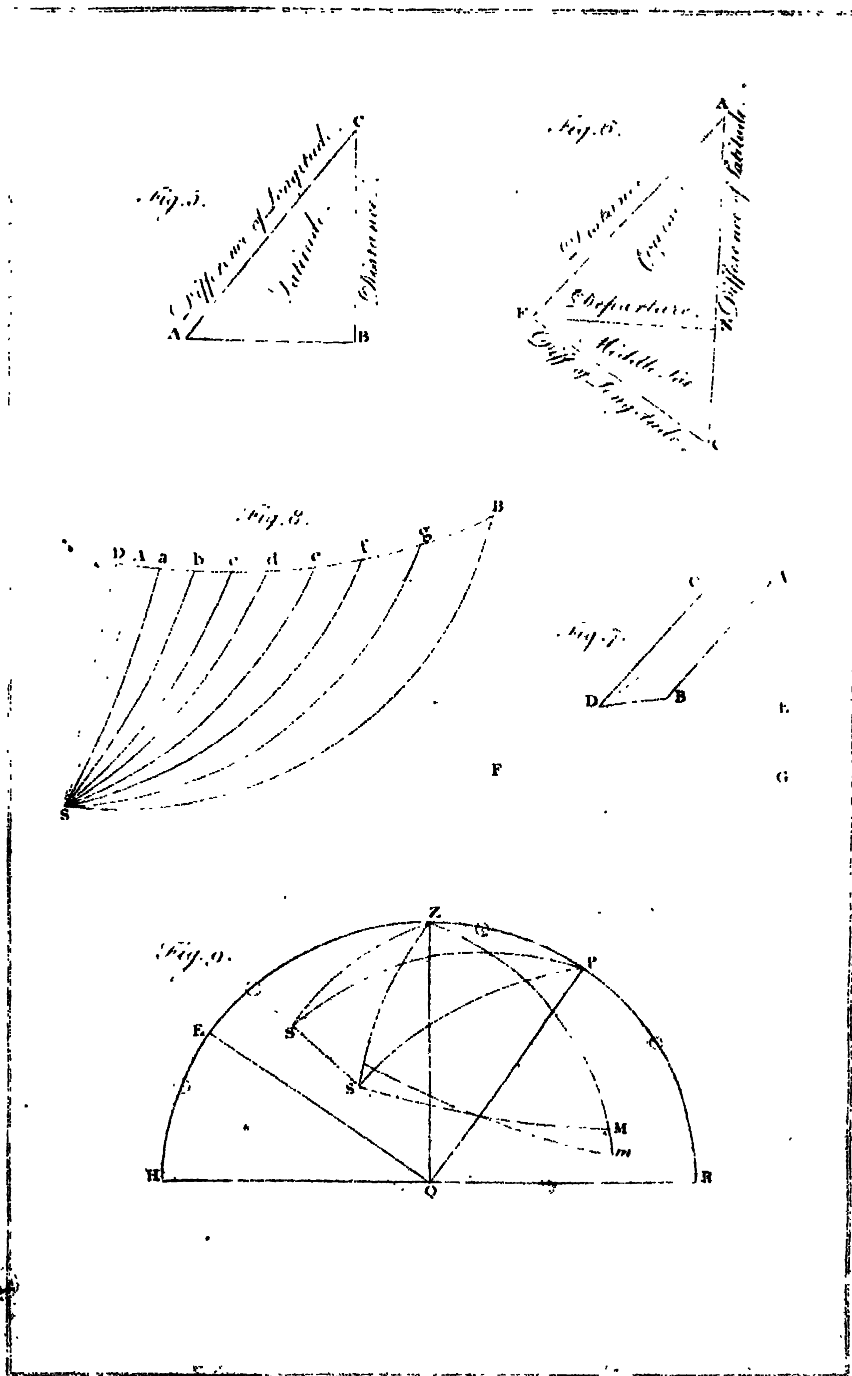
Fig. 5.
C
Difference of Longitude
Latitude
Distance
A
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Fig. 6.
A
Distance
Course
Difference of Latitude
Departure
F
Middle Lat
Diff. of Longitude
Fig. 8.
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Fig. 7.
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A
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Fig. 9.
Z
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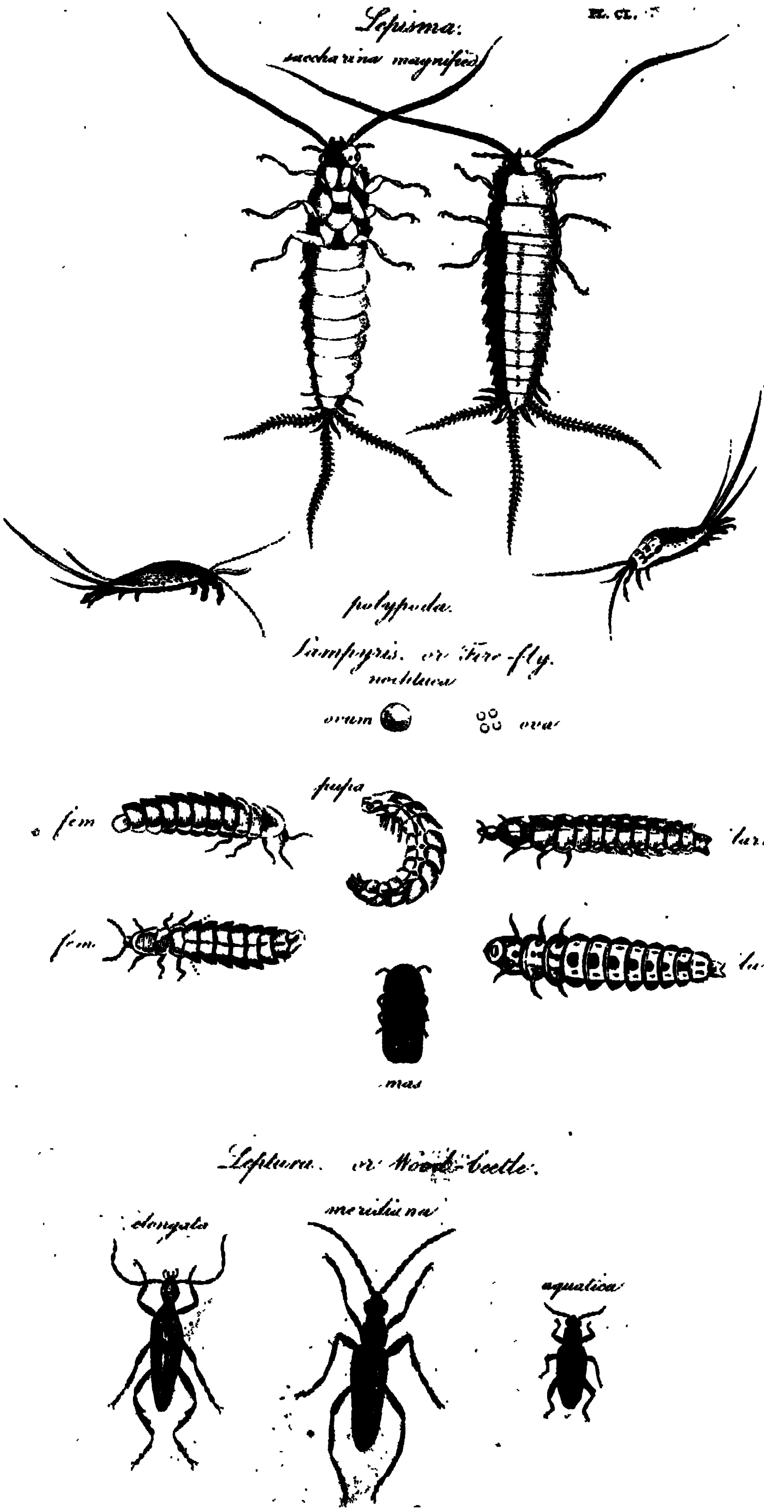
Lemur.

L. Volans. or Flying Maucauco.

L. Tardigradus. or Slow Lemur.


Lepisma:
saccharina magnified
Pl. CL.
polypoda.
Lampyris. or Fire-fly.
noctiluca
ovum
ova
pupa
fem
larva
fem
larva
mas
Leptura. or Wood-beetle.
elongata
meridiana
aquatica

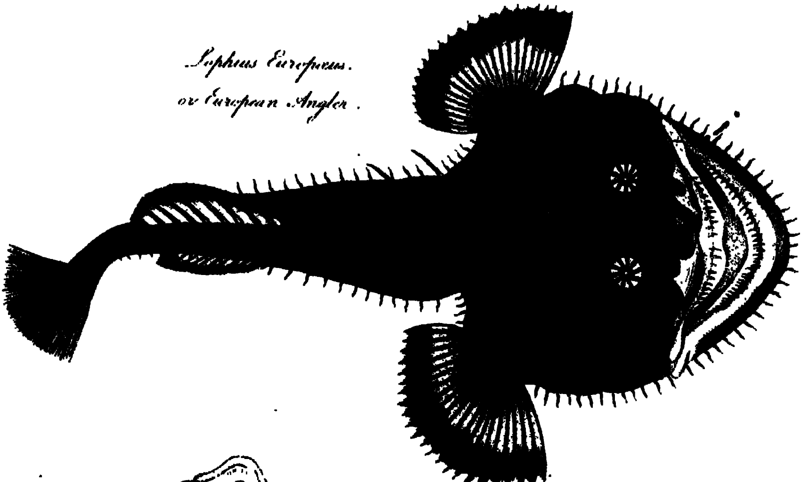
NATURAL HISTORY, PL. CLI

Lepus, or Hare

Lophius.

Lophius Pictus or Painted Angler.

Lophius Europaeus. or European Angler.



Loricaria Flava. or Yellow Loricaria.

Mural Quadrant.

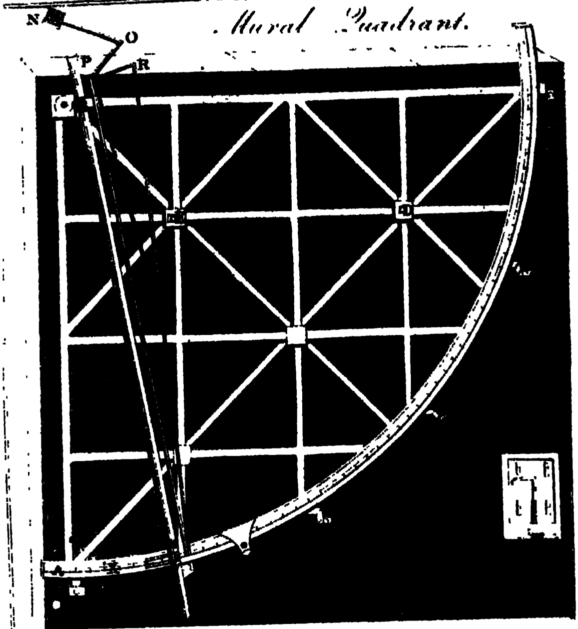
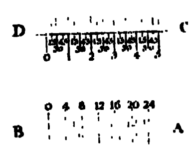
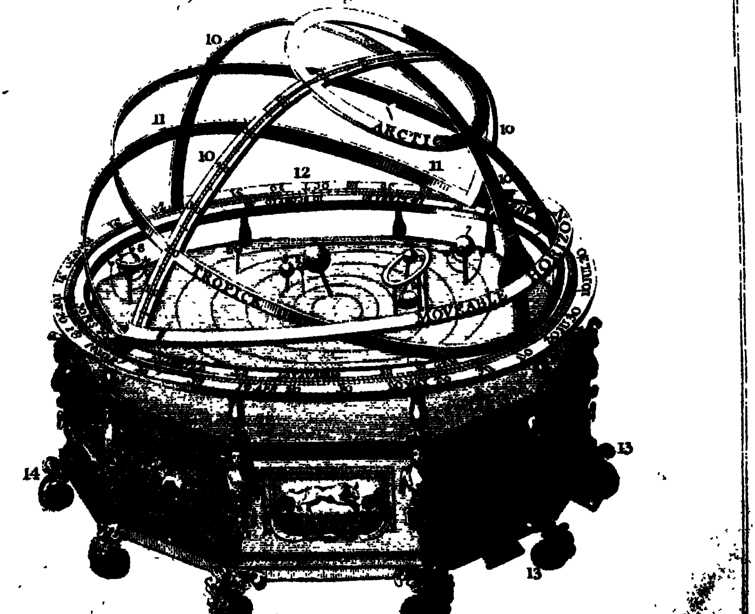


Fig. 2.



Grand Orrery.



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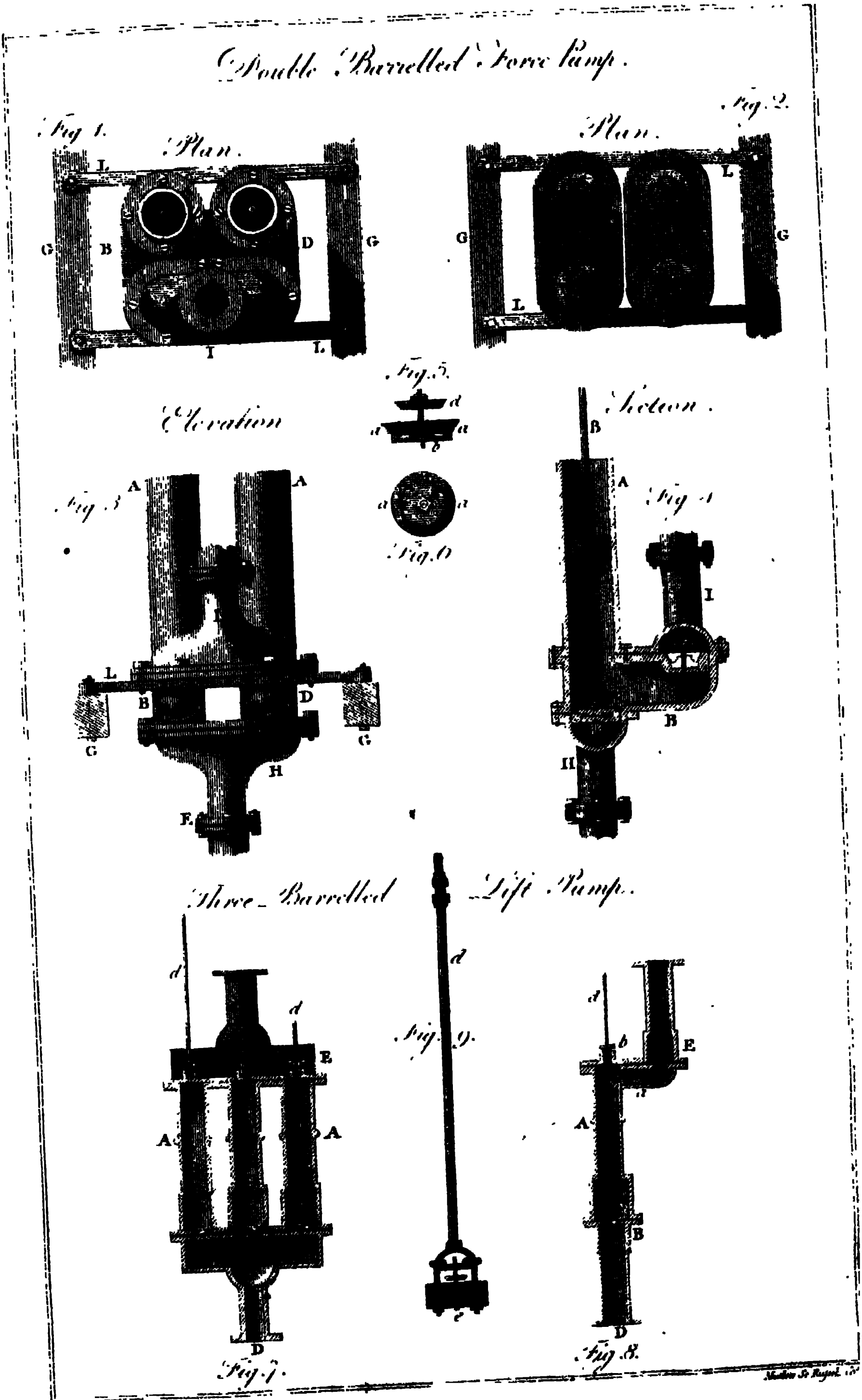


J. Farey delin.

Mutlow Sc Russel Ct.

Published by Sherwood & Co Paternoster Row, Aug 1st 1811.

Carnaby's Song on Peace.

Published by Sherwood &c. Paternoster Row

Love the Sire of pleasing fears,	And mindful of the past employ,
Sorrow smiling thro' her tears,	Merry bosom spring of joy.

H Mutlow Sc Russell

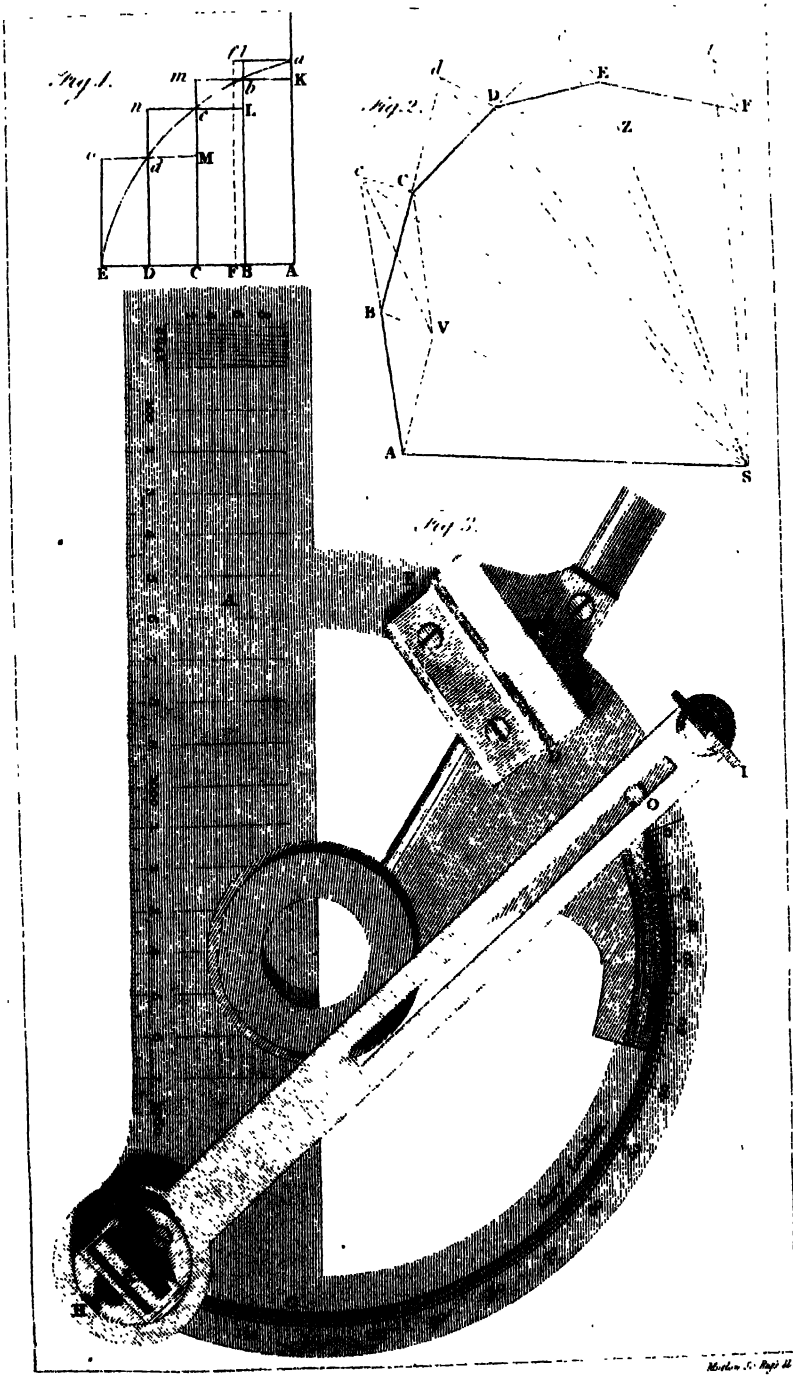
Published by Sherwood & C°

Published by Sherwood & Co. Paternoster Row

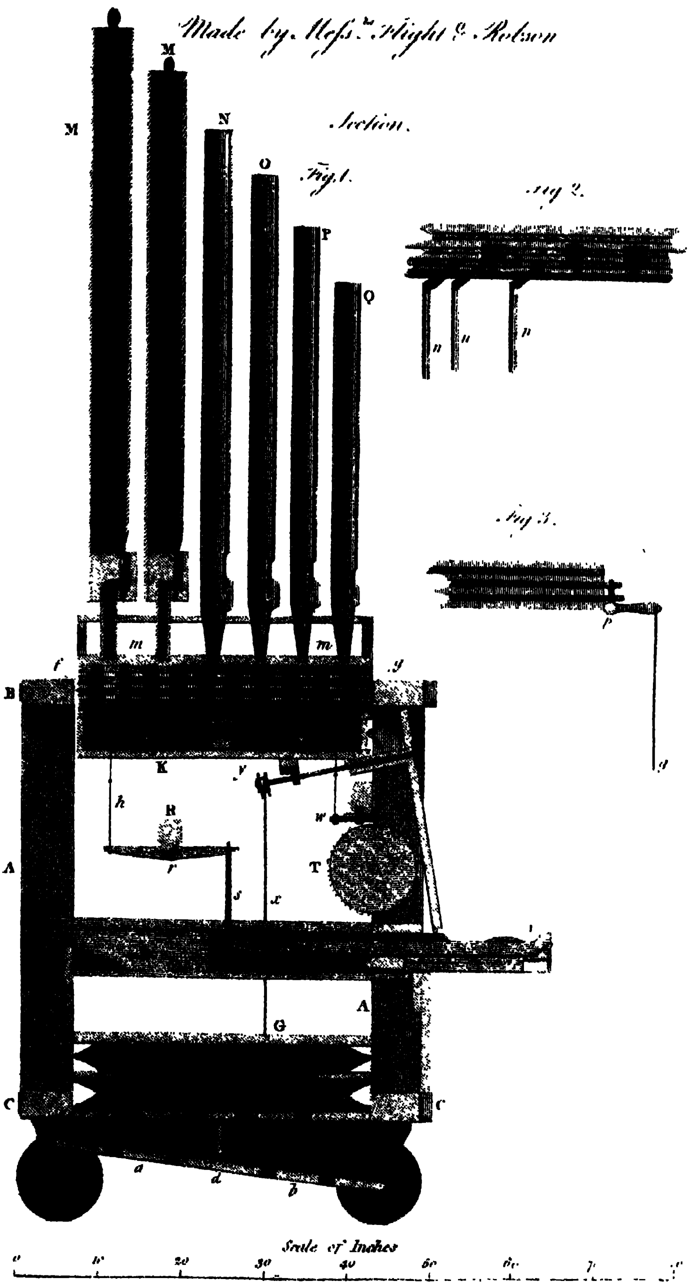
THE CHRISTIAN PARTING,

From Mozart's Ehliche Gute Nacht.

Now adieu!
We must lose each other's view;
But united still in spirit,
Mansions we shall soon inherit
Everlasting, ever new.
Now adieu!



Mutlow Sc. Russ. St.



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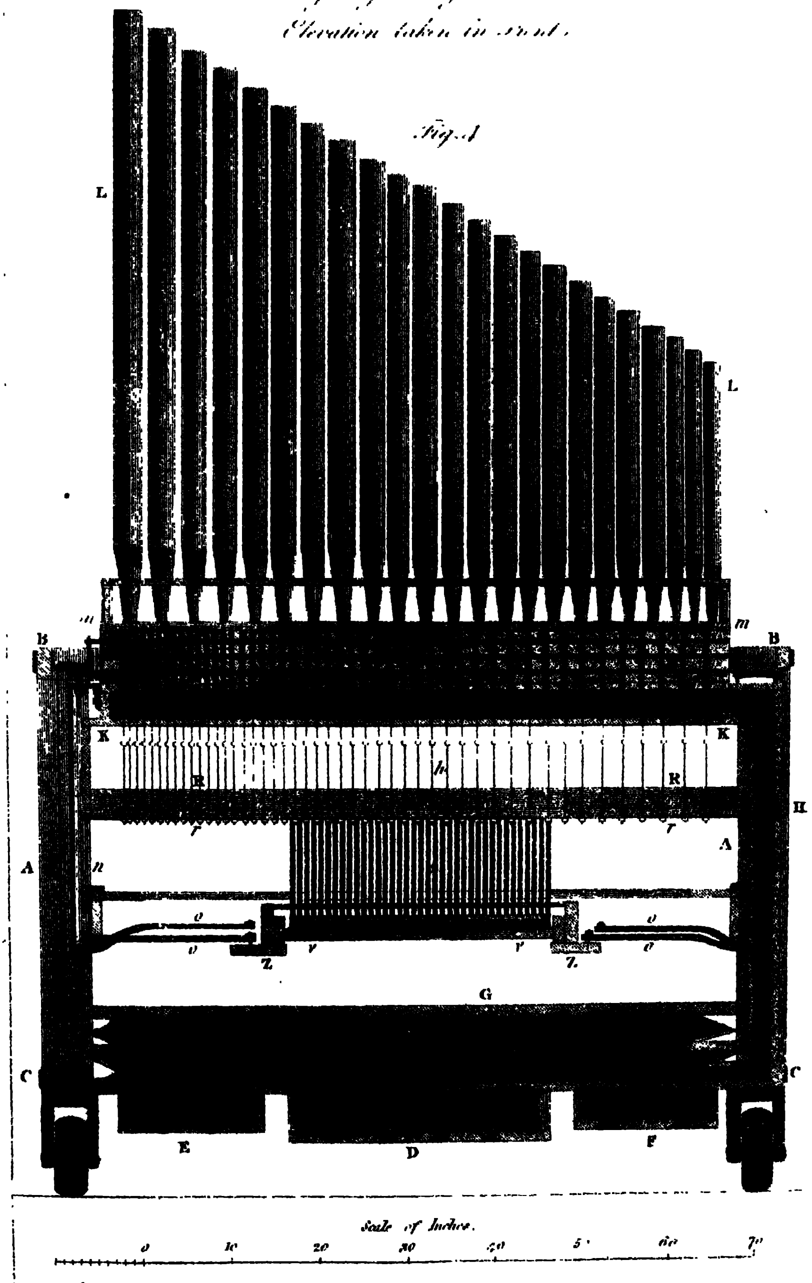
Made by Mess.rs Flight & Robson.

Elevation taken in front.

Fig. 1.



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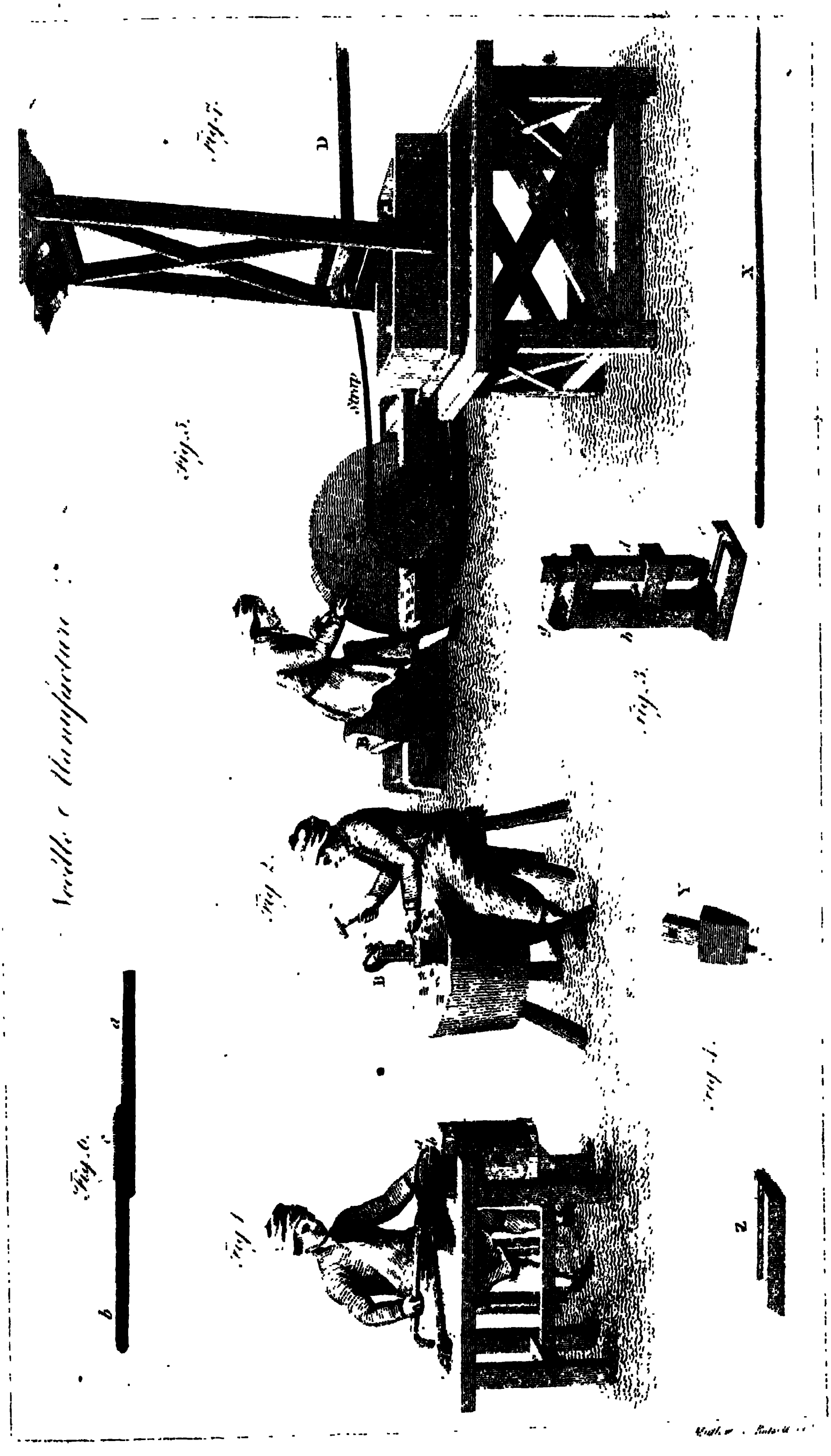
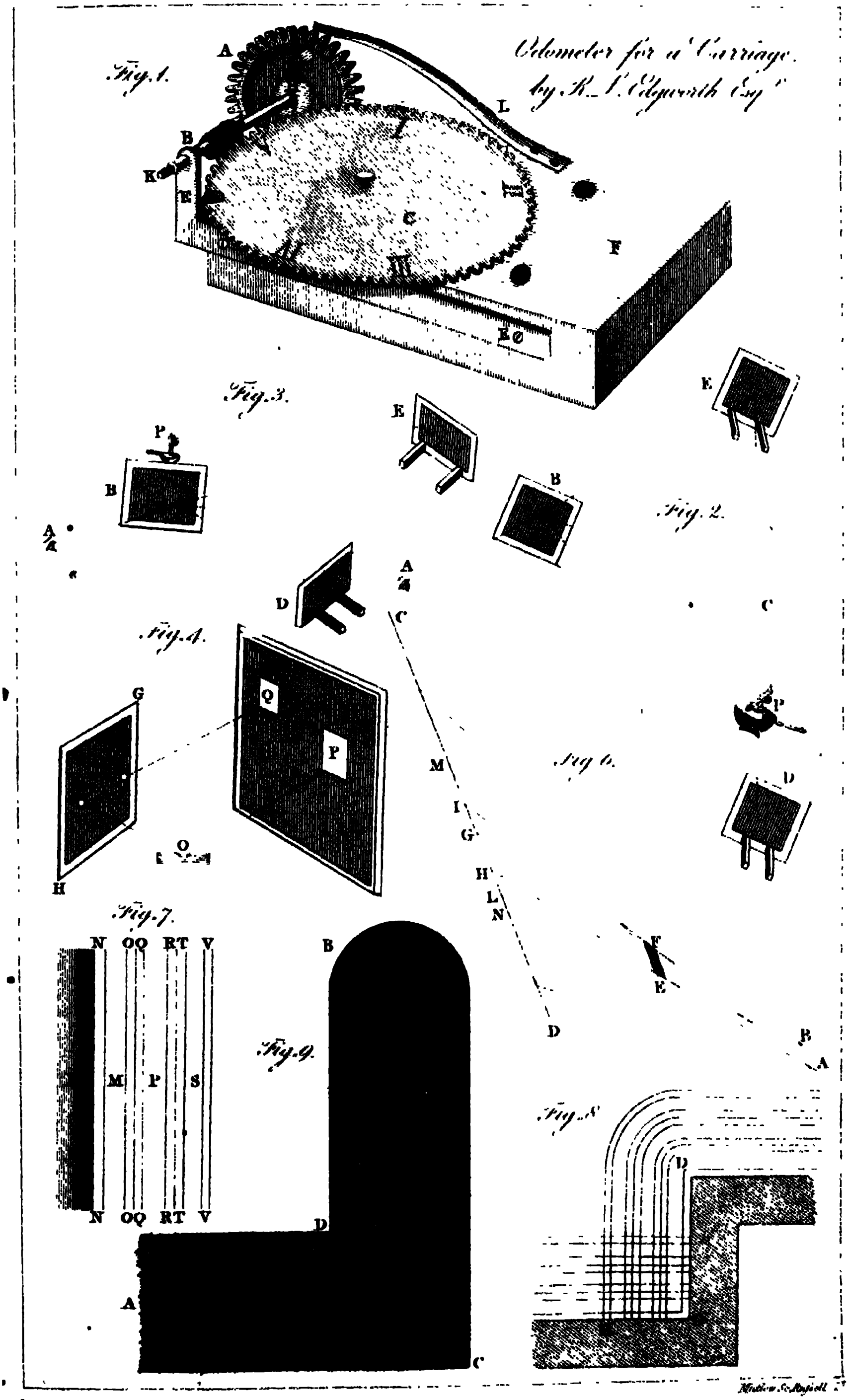
Mutlow & Russell sc.

London Published by Sherwood & Co. Paternoster Row Nov.r 1.st 80




Odometer for a Carriage.
by R. L. Edgeworth Esq.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 6.
Fig. 7.
Fig. 8.
Fig. 9.
Mutlow Sc. Russell Ct.

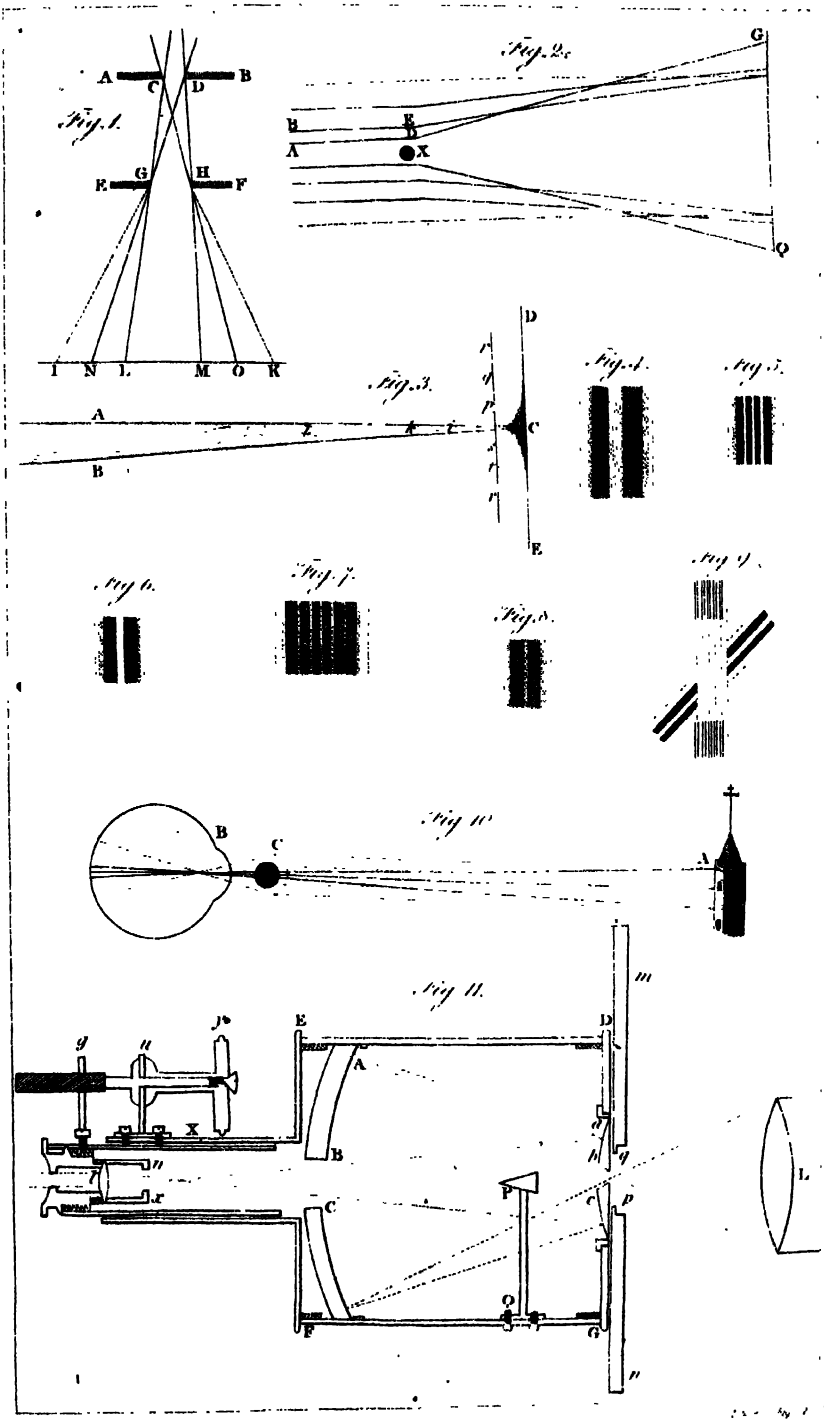


Fig. 1.
A
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Fig. 2.
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Fig. 3.
A
B
D
C
E
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Fig. 9.
Fig. 10.
B
C
A
Fig. 11.
E
D
A
B
C
P
O
F
G
X
L
m
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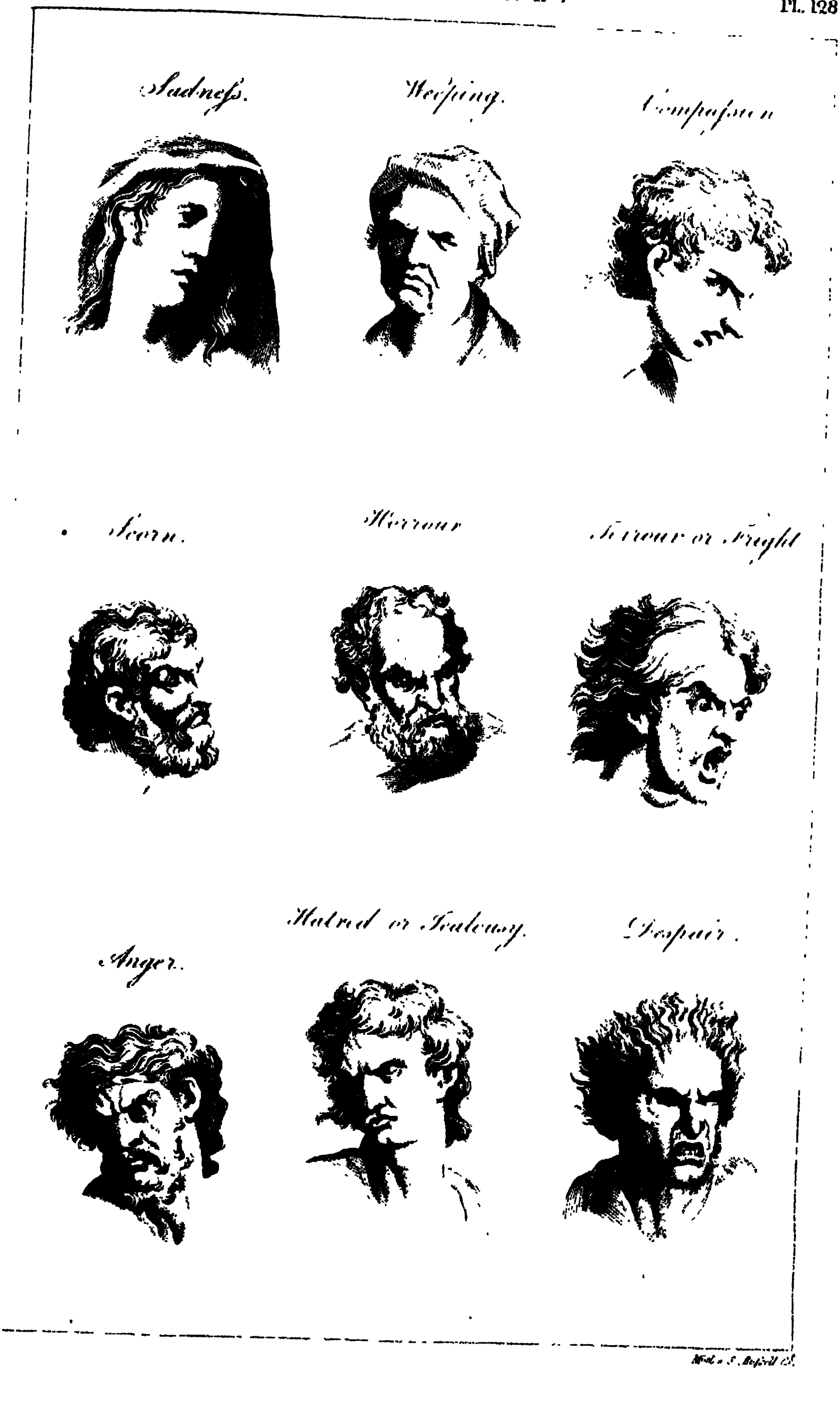
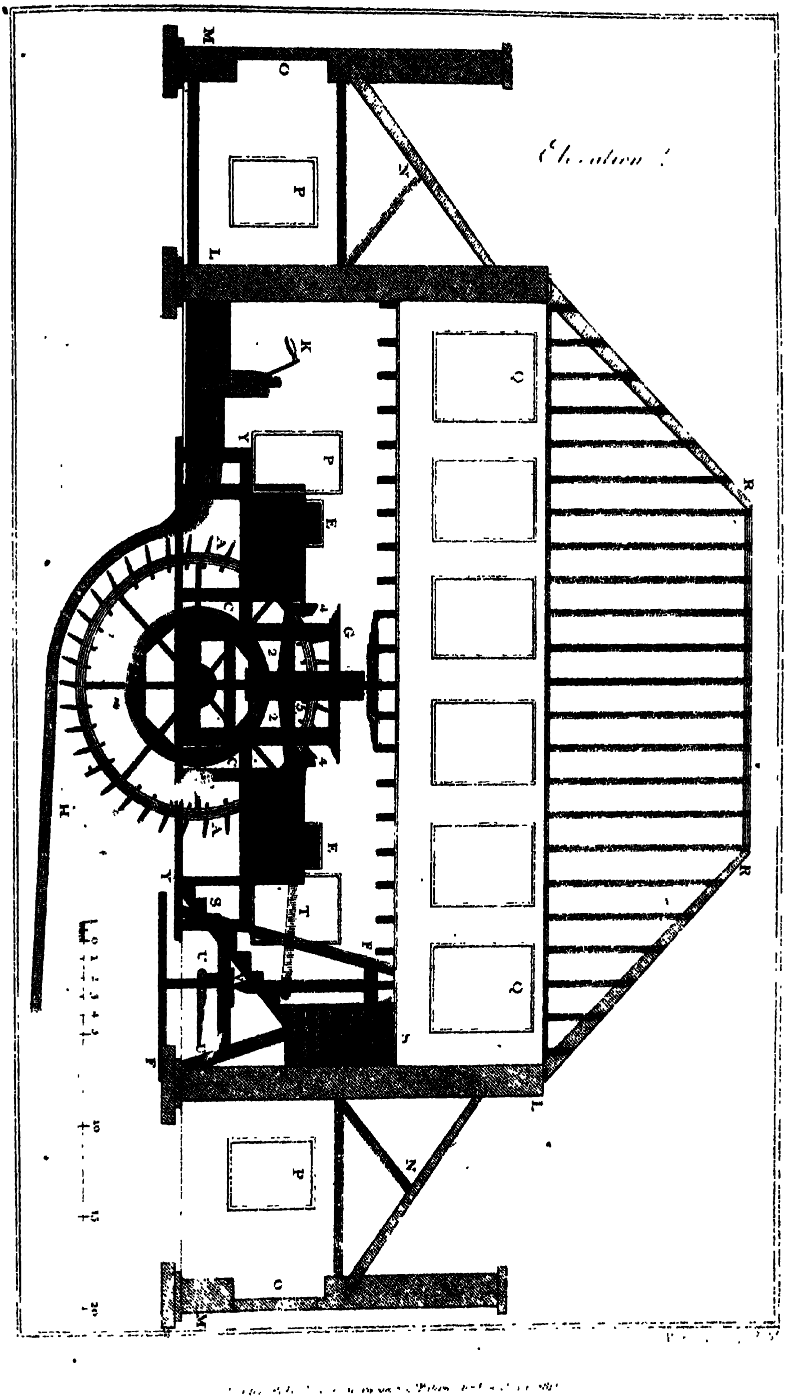
q
p

PASSIONS.


Admiration.
Attention
Veneration.
Admiration with Astonishment.
Rapture
Joy with Tranquillity
Desire.
Laughter
Simple Bodily Pain
Acute Pain.

PASSIONS.


Sadness.
Weeping.
Compassion
Scorn.
Horrour
Terrour or Fright
Anger.
Hatred or Jealousy.
Despair.


Elevation